amateur radio

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NOVEMBER, 1969
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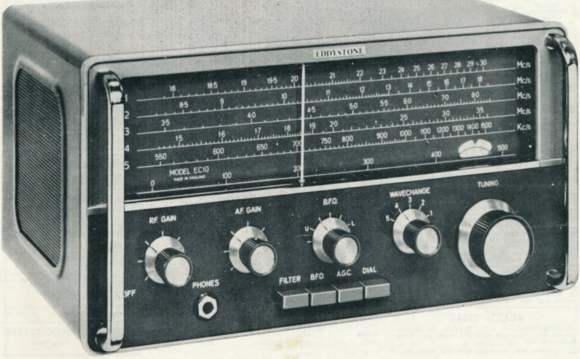

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amateur radio

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Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Non-members of the W.I.A. should write to the Victorian Division, C/o. P.O. Box 36, East Melbourne. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence; in addition, "A.R." should also be notified. A convenient form is provided in the "Call Book".

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COVER STORY

The illustration on our front cover is the Eddystone EC10, fully transistorised communications receiver, which was featured editorially in September "A.R." One of the most versatile receivers in the Eddystone range, the EC10 is now immediately available from R. H. Cunningham Pty. Ltd.

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FEDERAL COMMENT:

MR. CARROLL RETIRES

At the Annual Dinner of the Victorian Division of the Wireless Institute of Australia held at Clunies Ross House on 24th September, a presentation was made to Mr. Charles Carroll on behalf of the Federal Council to mark his retirement from the Postmaster General's Department.

Mr. Carroll held the post of Controller, Radio Branch; it is with the person holding this post that the Federal Executive most often has personal contact when making representations to the Central Administration of the Radio Branch on behalf of the Federal Council.

Mr. Carroll became Controller on the retirement of Mr. L. F. Pearson, and at a time when the "Handbook for the Guidance of Operators in the Amateur Service" was about to become under review. This review very quickly became a joint exercise, with both the Departmental Officers and the Institute Officers working together. The result was undeniably very successful. Amateurs were given some new privileges, the book itself became much easier to follow and contained more information than ever before. A number of anomalies and inconsistencies were deleted. Out of these discussions emerged a better understanding and relationship between the Department and the Wireless Institute of Australia.

Unlike the A.R.R.L., the Wireless Institute is not faced with the quasi judicial rule-making procedures of the Federal Communications Commission. Regulatory innovation or amendment are in Australia very much dependent on the individual view of the professional administrator. Thus it is important to the Amateur Service that the person responsible for making the decisions that affect the Service understand Amateurs and the objects of the hobby generally.

Mr. Carroll, we felt, was interested in the W.I.A. as an organisation and not only as another aspect of his administration. He found the time to go to Sydney in 1968 to attend, in his official capacity, the Inaugural I.A.R.U. Region III. Congress and the Federal Convention of the W.I.A.

In addition, he has regularly attended functions in Victoria.

In making the presentation to Mr. Carroll, I pointed out that we were not honouring him because we thought he had been unduly biased in favour of the Amateur Service but because we felt that he had always been prepared to listen to us and had always been fair in his treatment of the Amateur Service.

In his reply, Mr. Carroll made some observations that I think are very significant and are worthy of consideration by all Amateurs.

He referred to the ever increasing pressures on the radio frequency spectrum and pointed out that many other Services had set target dates to achieve the total utilisation of single sideband or other frequency conserving techniques. He suggested that the Amateur Service should give very serious consideration to setting a similar target date for the non-use of double sideband techniques on its high frequency bands. Mr. Carroll stressed that in order to be able to justify its retention of the bands allocated to it, the Amateur Service must not only demonstrate that it is fully using these bands in terms of occupancy, but also that it is using them as effectively as practicable.

Of course what Mr. Carroll has suggested, has for all practical purposes, occurred on the 20 metre band and only to a slightly lesser extent on the 10 and 15 metre bands.

I can well envisage that some hands will be thrown in the air in horror at such a suggestion in relation to the 40 and 80 metre bands. No doubt a conflict instantly arises between the asserted right of the individual to use the techniques and modes of his choice and the importance of using the most modern techniques and modes in part justification of our retention of our bands.

However, experience has shown that in bands subject to the greatest pressure, for example the 20 metre band, Amateurs have attempted to overcome the problem of achieving effective communication notwithstanding dense band occupancy by resorting to the most modern techniques. In the long term it is probably hard to measure the real significance of the techniques adopted by the Amateur Service in the fight for the retention of Amateur frequency space. It cannot, I think, be denied that what Mr. Carroll says is obviously good sense. His experience in this area cannot be disregarded and I urge that full weight be given to his suggestions.

So far as our relationship with the Central Administration of the Postmaster General's Department is concerned, I think that the patterns that have been set in the past will not quickly change and we look forward to a similar relationship with Mr. Carroll's successor as we have enjoyed with him.

MICHAEL. J. OWEN, VK3KI,

Federa President, W.I.A.

Diddley Dah Dah Dah Dah Dit!

COL HARVEY,* VK1AU

EVERY so often a magazine article excites enough interest to break down one's increasing resolve to give up home brewing. The April 1968 "QST article on an integrated circuit electronic auto keyer is one example. Lulled into self justification by pious thoughts of learning the easy way about computer logic, gates, flip flops and what have you, I misjudged the amount of practice that was to be needed before I could send decent auto-generated Morse. Other Amateurs who have tried auto keyers seem to agree that those brought up on a standard "bug" find the transition by no means a quick and easy affair. However, once achieved, the resultant Morse is significantly better copy. Going from a straight key to an auto keyer should not be too difficult, but any thoughts of being hot-stuff simultaneously on all three types of key without lots of practice seems to be a pipe dream. Nevertheless, for those still with the right mental attitude to develop the skills needed to enjoy fast c.w., the following notes will be of interest.

The integrated circuit keyer described in "QST" (Fig. 1) works well and is easier to use and set up than equivalent circuits using blocking oscillators and relays. The Motorola ICs used are cheap, were readily available in Australia† and will fit nicely onto millimetric matrix board. The MC790P dual flip flop sells at about $2.15, and the MC724P gates and MC789P inverters at $1.17 each plus tax. Apart from the polarised tantalum capacitor preferred (but not essential) for the timing circuit, all components are readily available and a good night's work will see the thing wired up on matrix board (mine is about 3½" x 1½"). This method of construction has advantages over printed circuit board if the gadget does not work properly first time! If preferred, sockets‡ can be used to mount the integrated circuits, but this is not really worthwhile other than to improve appearance.

Early recognition of the difficulty of sending decent Morse without off-the-air practice, caused me to add to the basic "QST" keyer, a tone oscillator and integrated circuit amplifier keyed by an extra transistor switch. This provides about 60 mW. of audio and allows "monitoring" on the air, and practice off the air (see Fig. 2).

However the most essential part of the entire project is the "paddle". If you have not got or cannot make an easily adjustable reliable and comfortable paddle, my advice is to forget the project. To perservere with an unsatisfactory paddle means that both you and your audience will be frustrated by frequent errors and correc-

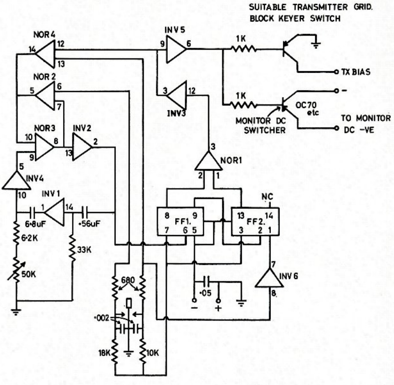


FIG.1. THE BASIC I/C KEYER IN Q.S.T.

Values are not critical. N.B.—Pin 11 of every IC is earthed (positive) and Pin 4 is negative.

MULTIVIBRATOR

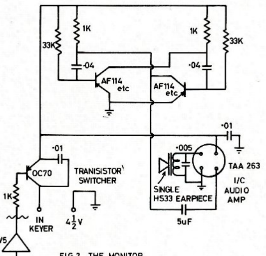


FIG.2. THE MONITOR.

Values are not critical. To decrease the audio tone, increase the 0.04 uF. capacitors in the multivibrator. The 0.005 and 0.01 uF. by-passes can be omitted if there is no evidence of "hash" in nearby equipment.

* 16 Leane St., Hughes, A.C.T., 2605.

† Cannon Electric, P.O. Box 25, Mascot, N.S.W.; Phone Mr. Fisher, 67-1488.

‡ Electrosil—"Augat" Range.

tions during each transmission. With a mechanically sound movement (such as the squelch relay from a TR5043) you can get into business with a moderately successful home-brew paddle.

Here's how: Remove the coil; drill a hole in the outboard end of the armature and add a short piece of plastic as a finger grip; clip two small springs to the armature as shown in Fig. 3 to supplement the very light centering/weight spring originally provided. The armature is now the common earth connection and the old double throw contacts become the Dot and Dash contacts. The relay base needs to be mounted firmly and then makes a reasonable substitute for a commercial paddle. Contrary to experience with some "bugs", only a light touch will be required.

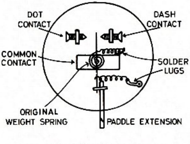


FIG.3. TOP VIEW OF MODIFIED RELAY.

The spring tension is not critical, providing it is strong enough to prevent "chatter". Even rubber bands will do the job.

The keyer should cause little trouble. Because it will need something of the order of 4 volts at 150 mA., it is wise to find this in some way other than from dry batteries. It will work at lower and higher voltages, but the flip flops seem to prefer "standard" pulses (about 3v.) to operate cleanly. Since there are more than 40 "transistors" involved, voltage in excess of about 4 volts does little except unnecessarily increase the current drain.

I use an a.c. half-wave transistor radio supply, set by Zener reference to 5.6 volts output, which is reduced to about 4½ volts at the keyer by appropriate adjustment of a 1K pot. Do not decouple the d.c. supply to FF1-FF2. It seems to affect toggling, causing occasional errors. The ICs are just warm to the touch at this voltage.

Without a miniature iron—even the Miniscope is a little too big—it will be difficult to do a decent job of wiring the ICs since a "bit" about the size of a match is really required.

The layout of the matrix board is best governed by the preferred relationship between power supply, paddle and transmitter. Fig. 4 shows the layout of the VK1AU Keyer. Due to the "low" input to some of the gates, etc., in the keyer and the possibility of diode rectification, precautions need to be taken to minimise r.f. pick-up. The keyer therefore needs to be shielded from strong r.f. fields and the leads to the paddle need to be kept short.

If a bug (such as an Eddystone) is modified to become the paddle, it will be possible to mount the entire keyer (less the power supply) on the bug base, where it will be shielded by the cover.

When considering the options, it is also necessary to recognise that any multivibrator radiates a signal rich in harmonics. Therefore if the monitor output is run in longish unshielded leads (to an ear piece for example) the keyed monitor signal may be heard (as "hash") in an adjacent receiver. If this is unacceptable, an audio oscillator of sufficient output could be substituted for the multivibrator. Alternative methods of keying the monitor exist, but to avoid the use of relays I key the negative return of the multivibrator and IC amplifier by an extra transistor switch turned on by INV5 in the keyer (see Fig. 1). Any GP audio transistor is suitable as a switch. The Mullard IC audio amplifier TAA263 drives an old HS33 ear piece loudly enough to allow practice even when there is a moderate background noise in the shack from radio or t.v. No output transformer is needed.

For the benefit of those whose keyer initially sends gibberish, and who are not confident about fault finding solid state devices, the voltage analysis at Table 1 should prove helpful. It should be read in the sense that gates and flip flops are either in one state or the other, i.e. the output is either low or

(continued next page)

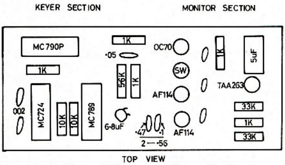


Fig. 4.—One suitable layout using matrix board.

Transistor SW is any transistor rated approximately for the voltage to be keyed in the transmitter.

Dash	Dot	Rest		Pin	MC789P HEX INVERTER	Pin		Rest	Dot	Dash
3	4½	4½		8		7		2	2	4½
3	3½	4½		9		6		0	2	3¼
4½	4½	3¾		10		5		4½	3	2¾
0	0	0	+	11		4	—	4½	4½	4½
3¾	3¼	2¼		12		3		4½	3½	3
4	4	4½		13		2		3	3	3
4	4	4		14		1		4½	3½	3½

Top View

Dash	Dot	Rest		Pin	MC790P Dual J-K FLIP FLOP	Pin		Rest	Dot	Dash
3½	3½	4½		8		7		4½	4½	4½
3½	3½	3¼		9		6		3	3	3
4½	4½	4½		10		5		4½	4	4½
0	0	0	+	11		4	—	4½	4½	4½
4½	4½	4½		12		3		4½	4½	4½
3½	2¾	4½		13		2		3¼	3½	3½
3½	4½	3		14		1		2½	2½	4¼

Top View

Dash	Dot	Rest		Pin	MC724P QUAD GATES	Pin		Rest	Dot	Dash
3¾	4	4½		8		7		4½	4	3¾
2¾	3	4½		9		6		4½	2½	4
4½	4½	1½		10		5		1½	4½	4½
0	0	0	+	11		4	—	4½	4½	4½
3	3½	4½		12		3		2¼	3½	3½
3	4½	4½		13		2		4½	3½	0
4½	4½	1½		14		1		4½	4½	3½

Top View

Table 1.—Voltage Table.

(50,000 ohms/volt multimeter. Positive probe to earth.)

high (equivalent to false and true). (Note that a high state, involving repetitive dots will show on a multimeter only as half the steady state deflection.)

In the case of inverters, voltage measurements can be misleading. The c.r.o. will be needed to show if the input wave form is being inverted, i.e. positive going at the input and negative going at the output, or vice versa. This can also be shown at INV5, which will if shorted and therefore not inverting, results in "sounder" type back-the-front Morse.

The operation of the JK flip flop pair is complex and will not be described other than to say that correct operation is indicated by evidence that the output state is being "toggled" from high to low state. Since toggling takes place at keying speed it is not easy to fault-find in this portion of the circuit. However the voltage analysis given in Table 1 gives values obtained from a working keyer.

For those with access to a simple c.r.o. the patterns at Table 2 will be useful for comparison. Probing other connections will generally show d.c. voltages toggling between high and low state.

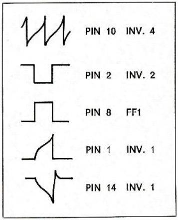


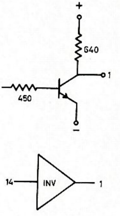
Table 2.—Waveforms (not to scale).
Time Base 50 c.p.s. int. sync. Keyer 20 w.p.m.

Use of the analysis should locate the segment of the circuit not performing according to the rules. Permanent failure of only one section of the quad gate, for example, does not necessarily mean that the entire IC must be scrapped. A transistor gate can be substituted for the faulty IC section. Appropriate circuits given in April "QST" are repeated at Fig. 5, others appear in manufacturers' literature. It should be possible to substitute any available gates, inverters or flip flops in any convenient combination which will achieve the same total function.

Personal skills are needed to send good auto-generated Morse. The initial practice needed to develop these skills has no place on the air, except perhaps for a brief fun contact with a competent and tolerant "buddy".

Practice sessions are best planned to use many foreign language words and English words that are difficult to send accurately at the first attempt (e.g. Neosyd, Motor, Tomorrow, Characteristic). These will develop a quick finger action more rapidly than sessions with easy words (e.g. she is his sister). Even with practice, I still find a tendency to try and send too fast, and therefore to run letters together. Also a momentary lapse of concentration produces hard-to-correct gibberish, while some words even refuse to come out right the first, and even the second time!

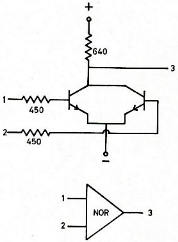
Only when listeners can make sense of such aberrations, without your having to revert to corrections with the hand key, have you got auto-keying made. SK.



(a)

Fig. 5a.—MC789P contains six inverters like this.

In the unlikely event of one section failing, a transistor equivalent can be substituted for the failed section. Values of R are not critical.



(b)

Fig. 5b.—MC724P contains four NOR gates like this.

Some Aspects of Radio Frequency Conductivity in Electro-Deposited Silver

R. G. STONE, VK5PB*

AFTER having made a sweeping statement recently on 40 and 80 metres, I thought I should clarify the situation by offering—for what it is worth—a little article dealing with what happens to be a revolutionary new concept proven beyond all doubt by a fellow colleague, and an Australian who virtually made history recently in America by having a superbly prepared paper, presented to the Technical Sessions of the 1968 American Electro-platers' Society Convention at San Francisco in July of that year, at which I was in attendance. I refer you to the work done by Alan Fowler, of the Australian Post Office Research Laboratory in Melbourne.

It has been the accepted, but erroneous belief, for many years, to always expect an r.f. conductor that has been silver plated to perform more efficiently than one in its natural unplated condition. The purpose of this article is to show some of the relative demerits of a practice widely accepted but now conclusively proved to be most undesirable. Before making a profound statement to a rather technically minded audience, it might be well to outline the basic history and growth of electro-plating, especially in the Precious Metal Plating Industry.

Almost any metal can be electro-deposited, the common ones used most universally are copper nickel and chromium. Silver and gold too have their part to play. Prior to 1940, with minor exceptions, these metals were plated from electrolytes that produced a finish of a dull and somewhat rough appearance that required polishing to make them attractive and acceptable. Nickel was found to be an excellent coating for ferrous materials and when certain additives such as coumarin (the basis of vanilla essence) was added in small quantities the grain structure was highly refined and the work came from the bath mirror bright and ready for immediate chromium plating without the usual buffing. Copper also received attention so the bright acid copper was subsequently developed in recent years.

At the commencement of the modern space age, there was a sudden demand for improvement in the deposition of the more rare and precious metals. Silver had been for some time known to be influenced by the small addition of carbon disulphide, to the extent that in the cutlery trade it became almost a common place thing to add the "silver brites" each morning to the tank and thus get a very smooth bright deposit requiring very little, if any, polishing. Gold, too, was found to have a very important part in electronics because of its very excellent resistance to corrosion and its good solderability.

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Rinker and Duva developed a gold, based on a cyanide formulation that gave mirror bright deposits from the bath, and several years later released a solution using citrates and other metal complexes to also provide gold alloys that were likewise mirror bright after plating. All this is very wonderful from the point of view of a beautiful decorative finish, but unfortunately to achieve this finish the additives used in the electrolytes quite commonly are co-deposited in the crystal structure and can cause harmful increases in the resistivity at d.c. and radio frequencies.

Unless a silver solution is continually filtered over activated carbon and electrolytically purified, it is impossible even with modern sequestering agents to produce a deposit of 100% purity. Another thought, most platers are not in the least concerned with their counterparts in industry, the electronic design engineers. A plater receives a job to silver plate, not only does he strive to produce a bright finish from a "loaded" solution, but will go even further and apply an undercoat of bright nickel to further enhance the beautiful white finish. Since cross sectional area has no relationship to r.f. conductivity, as r.f. only occupies the skin of a conductor, and that as the frequency increases, still less of it, consider the results of a tank coil with a deposit of nickel as compared to one constructed of plain copper. The conclusion is obvious. This effect, whilst not quite so pronounced, is evident in a silver plated inductor especially one plated from a heavily contaminated or so-called bright solution.

Nickel must be avoided at all costs; because generally the deposits are magnetic and as a result have very high r.f. resistance. A practical case of two r.f. tank coils for a high powered h.f. transmitter constructed from 3" o.d. 1/16" wall thickness copper tube—one plated with nickel and the other left bare copper. The copper one under load was measured for temperature and found to give expected output at 65°C., but the nickel one under similar operating conditions rose to 350°C. This is very near the Curie temperature for nickel, so as the temperature rose the permeability dropped towards 1.0, the skin depth increased, the current flowed in a thicker layer, and as a result the resistance levelled out and losses decreased until a stable condition was reached, but in doing so a very efficient piece of "shack" heating was evolved.

Consider the case of a finish system comprising a nickel undercoat, a layer of silver 500 micro-inches (12.5 microns) thick, followed by a gold protective layer 200 micro-inches (5 microns) thick. At 1 Mc., the thickness of the silver plate is only 20 per cent. of the skin depth, so that most of the current will flow in the nickel underlay, and cause high losses. At 100 Mc. the silver layer is slightly more than 1 skin depth thick, but the thickness of the gold layer is now about half a skin depth.

At 1 Gc. the gold layer is greater than 1 skin depth so that it carries most of the current. If the thickness of the gold layer is reduced to 50 micro-inches (1.25 microns) it will still carry an appreciable part of the current at 1 Gc.

A much thicker layer of silver is required at low frequencies, about 0.004 inch at 1 Mc., and a high conductivity silver plate (greater than 90% I.A.C.S.) must be used if a low loss coating is required. At ultra-high frequencies there seems little point in using a layer of silver, as with the above thicknesses the current will nearly all flow in the final layer of gold.

The problem is basically this, if silver is used, then in most cases, a relatively thick layer of gold is required for corrosion resistance. Apart from the cost, the thick layer of gold cancels out any electrical advantage gained from a layer of high conductivity silver.

Since silver is the topical metal under discussion, let us assert here that as yet there is no satisfactory silver solution based on an acid electrolyte. They are in fact all composed using cyanide for the metal ion complexing agent.

Cyanide in solution is continually decomposing, the cyanogen content becoming less each day and the resultant carbonate increasing. In doing so, other properties form under electrolysis and the cyanide further undergoes chemical changes to produce complex polymers. Unless removed by carbon treatment, precipitation or low current density treatment they will ultimately build up until they become objectionable and co-deposit with the silver to a degree that even small traces will produce a silver deposit **that is not pure**, and this is the whole crux of the situation.

Recently it was announced from a major copper refiner that a new copper alloy was available with improved conductivity over pure wrought silver, but it is still in the writer's opinion that copper, plated from a pure electrolyte solution, will, on a commercial basis provide a better job than anything else so far. To achieve even greater efficiency it is necessary to have the surface of the conductor as smooth as possible to the extent of buffing by hand to a mirror finish, applying a coating of at least 2-3 times the r.f. skin depth with electro-deposited copper and again polishing and leave the silver well alone.

A thin flash, say, 10-15 micro-inches of gold will preserve the finish and prevent tarnishing and make the sol-

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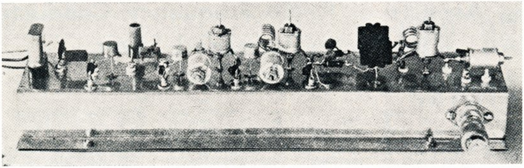


A Two Metre "Snowflake" Transistor Transmitter*

R. J. BARRETT, GW3DFF

THE transmitter described in this article is the result of investigation and experiments over the past few years in an effort to build a cheap 144 Mc. Transistor Transmitter with a reasonable power output that can also be used for portable work.

The design breaks away from the usual highly expensive semi-conductor associated with v.h.f. transmitter stages and uses four 2N2218 "Snowflake" transistors, so called because the internal geometry of this device resembles a snowflake in design (see Texas Instruments 2N2218 Data Sheet No. 633544). At present, these devices are available at 7/9 each.

The 2N2218 has a maximum voltage rating of 60v. between collector and base (V_{CBO}) and an F_T of 250 Mc. These are used in a common base configuration, taking advantage of the high collector base voltage rating. Although the power gain in common base is less than in the more usual common emitter configuration, stability is much improved and unwanted frequencies from the crystal oscillator and multiplier stages are not passed through to the final p.a. so easily.

The oscillator and doubler stages use the well known 2N1613 transistor which has a V_{CBO} of 75 volts, an F_T of 60 Mc., and is priced at 4/3.

The transmitter was designed using easily obtainable parts and may be attempted by anyone who has had a little previous experience with transistor circuitry.

The chassis is made from tin plate folded as shown in Fig. 1 and its rigidity may be improved by fixing a bottom plate cut from the same material with four 6BA screws. This material has been chosen because the design calls for many soldered connections direct to the metal, and no-one wishes to make connections to transistors with a 150 watt soldering iron!

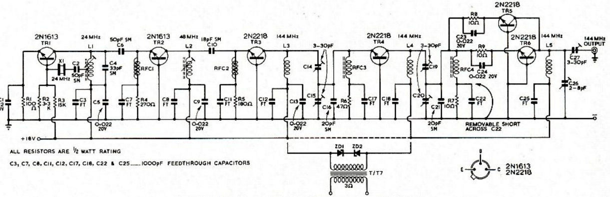
Caution must be taken with the decoupling capacitors and only 1000 pF. feed-through types should be used. Efficient decoupling is of extreme importance in low impedance circuits.

Only the specified radio frequency chokes should be employed. These are critical components and must be of the lowest inductance possible consistent with performance.

Start by drilling the chassis and fixing the feed-through insulators in position. Some of these are used as feed throughs and some as convenient anchor points for components and wires. Note that the feed-through next to the aerial output socket is in fact earthed. This is to provide a convenient earth point when trying various lamp loads should you not wish to use the method described later.

The crystal oscillator uses a 24 Mc. overtone crystal and is built on the underside of the chassis. The emitter biasing components, R1 and C1, are soldered direct to the chassis at the one end with the other ends soldered direct to the emitter of TR1 with no additional support. The normal base biasing resistors are R2 and R3. Feedback through the crystal is achieved by a centre tap on L1. Output from the oscillator stage is taken via C6 to

* Reprinted from "Radio Communication," Feb., 1969.



CIRCUIT DIAGRAM OF THE R.F. STAGES OF THE TRANSMITTER

RFC1, RFC2—25 uH., 90 turns of 36 s.w.g. enamel covered wire pile wound on a 1 megohm 1 watt resistor.

RFC3, RFC4—3 turns of 23 s.w.g. on Radiospares Ferrite bead, toroidal wound.

12 Lektrokit feed through bushes part No. LK2121;

12 Lektrokit soldering pins part No. LK3011; or Radiospares lead through insulators (fit 5/32 in. hole).

L1—16 turns centre tapped 22 s.w.g. enamel covered wire on ¼ in. o.d. former.

L2—8 turns 22 s.w.g. enamel covered wire on ¼ in. o.d. former.

L3—5 turns 16 s.w.g. tinned copper wire ¼ in. i.d., 5/8 in. long.

L4—5 turns 16 s.w.g. tinned copper wire ¼ in. i.d., 5/8 in. long.

L5—4 turns 16 s.w.g. tinned copper wire ¼ in. i.d., 5/8 in. long.

1000 pF. feed through capacitors from Radiospares.

the emitter of TR2. This transistor is connected in common base and its base lead should be cut to approximately 5/8 in. and soldered direct to the chassis. The bias resistor R4 is beneath the chassis and soldered direct to it (see Fig. 2). Reference to Fig. 3 should make the mounting of the transistors quite clear.

Transistor TR2 is doubling to 48 Mc. and output is taken via C10 to TR3 tripling to 144 Mc. Tuning for TR3 is arranged by two concentric trimmers C14 and C15 connected from TR3 collector to chassis. C15 has its centre connections soldered direct to the chassis and C14 is supported by soldering one of its outer connections to the adjacent feed-through insulator. Refer again to Fig. 3. Capacitor C16 which is connected in parallel with C15 is soldered below the chassis. Output from this stage is taken from the junction of C14 and C15 and by adjusting the two capacitors which in effect are tapping up the coil and matching the impedance to the following stage. Transistor amplifiers of this type perform best when heavily loaded and instability may result if the lower capacitor is screwed in too far.

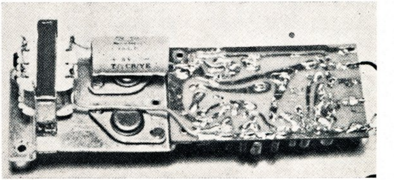
TR4 is the driver stage and feeds TR5 and TR6, the power amplifiers, connected in parallel through separate emitters, thus preventing "current hogging" by one transistor. Should one of the power amplifier transistors become much hotter than the other, increase the value of R8 and R9 slightly. This will reduce the output somewhat, but slightly increase the efficiency. Another way to overcome this trouble is to try various pairs of transistors until they appear to run approximately at the same temperature. Testing with the finger is quite adequate.

All the transistors in this transmitter run quite hot to the touch. To assist cooling, TR5 and TR6 are fitted with small clip-on heat sinks. Silicon transistors can run quite safely to 200°C. so do not become too alarmed if you only have experience of germanium types.

The output stage has been designed to work into a 75 ohm load and lamps which do not approximate to this resistance when hot may give a false indication of the output. A 6v., 60 mA. type is probably best for initial tuning, but it should be possible to light a 6v. 0.1 amp. bulb to the point of burn out when the circuit is peaked for maximum output.

Unscrew all trimmers to the minimum capacity position. Unscrew both slugs in L1 and L2 as far out as possible. Connect a 0 to 10 volt d.c. meter between C7 and the chassis. Apply positive 18 volts to the supply rail. Screw in the slug in L1 and adjust for maximum meter reading. This should be approximately 2 volts.

Remove the meter and reconnect it between C11 and the chassis. Adjust the slug in L2 for maximum meter



The modulator unit.

No meter is included in the power amplifier circuit of the transistor and this may be viewed with some concern by Amateurs who feel that a transmitter without a meter may be uncomfortable to use. In practice, it has been found that one soon becomes quite accustomed to its absence, but of course a meter may be fitted if desired.

ALIGNMENT

Alignment of the completed transmitter will be assisted by connecting a 6v. 60 mA. pilot lamp as a load across the output and by an absorption wavemeter tuning 24, 48 and 144 Mc.

reading, approximately 1.5 volts. Connect the meter across C17 and adjust C14 and C15 for maximum voltage on the meter, approximately 1 volt. Connect the meter across C22 and adjust C19 and C20 for maximum voltage, approximately 0.6 volt. Remove the meter and short out C22 to the chassis. Adjust C26 and C27 for maximum brightness in the lamp load.

Connect a 200 mA. meter in the supply to the driver and power amplifier stages. Adjust all slugs and capacitors again, starting with the crystal oscillator, this time for maximum current in the meter, approximately 150 mA. For high level modulation the

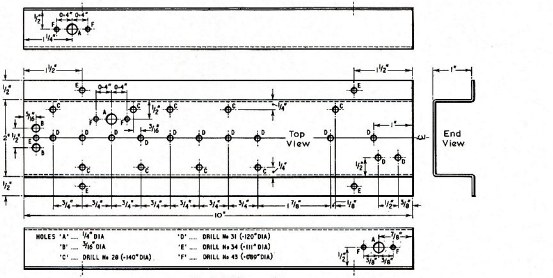


Fig. 1.—Drilling template.

short circuit across C22 should remain. Removal of the short should cause the combined driver and power amplifier current to drop to approximately half. This is the correct condition for low level modulation. With a positive 18 volt supply, power input to TR5 and TR6 is about 2 watts and output at 144 Mc. is approximately 1 watt.

MODULATION

Amplitude modulation of transistor power amplifier stages can be most successful providing one or two precautions are observed. It is most important that the maximum collector to base voltage rating (V_{CBO}) is at no time exceeded, in our case 60 volts. If a supply rail of positive 18 volts is used then twice this voltage can appear at the collector as the tuned circuits are, of course, inductive. Any modulation voltage applied to the collector will be superimposed on the top of this and, therefore, must be limited to 24 volts peak to peak. This is assured by connecting two 12 volt Zener diodes back to back across the modulation transformer secondary, thus clipping off all modulation peaks above 24 volts, thereby safeguarding the final transistors and providing a measure of speech clipping.

The feed-through capacitance in a transistor will allow power to pass through the final ampilfier even if down modulating audio has reduced the collector voltage on the final to zero. This produces an under-modulation effect in which it is impossible to modulate fully in the downward direction. This is overcome by modulating the driver stage as well as the final.

A suitable modulator for this transmitter would deliver about 2 watts output and could be completely transistorised. The unit shown in the photograph has been used very successfully and is a type PC5 Newmarket transformerless amplifier which is obtained ready built at a very reasonable price. The output is rated at 3 watts using a negative 12 volt supply, but we are using it on a negative 9 volt rail, reducing its output considerably. Note that this unit uses PNP transistors and must have its own separate battery.

The modulation transformer presented quite a problem as an easily available type was required together with small size. A Radiospares type T/T7 transistor transformer was used, the output of the amplifier being taken via a 500 uF. capacitor to its low resistance winding (3 ohm). The other winding, the centre tap of which is not used, serves as the modulation transformer secondary, and has the two Zener diodes Z1 and Z2 connected back to back across it. Although this transformer is only rated for 500 mW. output, it performs very well, and reports on the modulation have been excellent. The transformer is mounted on the amplifier by a tinplate strap ¼ in. wide, soldered around the laminations, the ends bent around the amplifier heat sink.

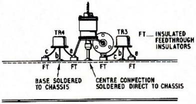
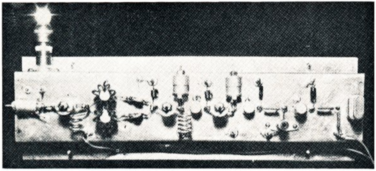


Fig. 3.—Diagram showing detailed layout of the p.a.

The power amplifier stages in the transmitter are working in class B and low level modulation may be successfully applied by removing the short across C22 and feeding audio in at this point. This may be via a large capacitor or R7 may be replaced by a transformer, the secondary resistance of which is approximately 10 ohms. A few milliwatts from a small single ended transistor amplifier will fully modulate the transmitter at this point.

Some success was achieved with narrow band frequency modulation by connecting a type BA107 variable capacitance diode across the crystal. A maximum deviation of about 5 Kc. was achieved at 144 Mc.



General view of transmitter taken during the alignment process.

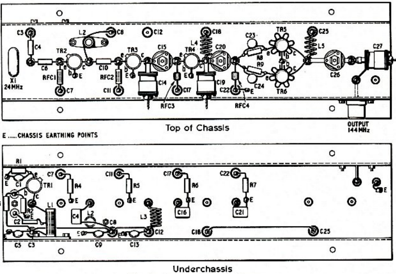


Fig. 2.—Component layout diagram.

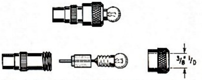


Fig. 4.—Diagram showing construction of r.f. load.

A suitable method of constructing a lamp load by drilling out one section of a standard co-axial aerial plug to hold a pilot lamp is shown in Fig. 4. The lamp is a 6 volt 100 mA. type and has a short length of wire soldered to its centre tip, and this is passed down the body of the plug and soldered to the centre pin.

RESULTS

The transmitter is quite cheap and simple to build. Up to this time four models have been completed, one on a printed circuit board,. All the transmitters produced a similar power output. The best DX result so far is over 200 miles, and stations have often been surprised when told of the low power input, and all transistor construction. The output is sufficient to drive a type 4388 Varactor diode tripling to 432 Mc., giving about 400 mW. at this frequency. Excellent reports have also been received on this band.

Clock Modification for 24-Hour Movement

G. SUTHERLAND,* VK3VW

The June 1968 number of "Electronics Australia" described a method of slowing down a standard a.c. mains-operated electric clock by supplying it with 25 cycle a.c. instead of the normal 50 cycle a.c. There are two disadvantages of such a system.

Firstly, a separate multi-vibrator power supply has to be built up to provide the necessary 25 cycle a.c. supply, and, secondly, when such a power supply system is used, the entire movement is slowed down to half speed, resulting in the minute hand being slowed down to one revolution in every two hours.

For most of us, I would think that a normal minute hand with a one-hour rotation is desirable, particularly when working skeds in either GMT or in local 24-hour time. The solution, therefore, is to slow down the hour hand to half speed, leaving the minute hand to operate at the normal speed. This is not a very difficult matter, although the mechanical problems will be greatly simplified if some lathe facilities are available. I am sure that if necessary most Amateurs would be able to find someone to help them in this direction.

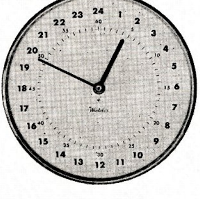
The clock shown in the illustration is a Westclox battery-operated model with a 7" diameter face available at a trade price of about $6.50. However, there is no reason why a mains-operated clock should not be used provided there is sufficient space behind the dial to accommodate the gears.

The author used a battery-operated model in preference to a mains-operated one because it is readily portable and, also, on certain occasions, it is necessary to switch off the entire mains supply to the shack.

It is an easy matter to dismantle this particular clock. The hands and face are removed and a 1:2 reduction gear train is attached to the hour-hand spindle. This, of course, reverses the direction of the hour hand, and a 1:1 gear is then used to return the hour hand to the central spindle, at the same time changing the direction of rotation of the hour hand back to the normal clockwise direction. The accompanying diagram should make this clear.

It is obvious that the two pairs of gears must be of such a diameter that the distance between the centres is the same. The author obtained his gears from the Model Dockyard Ltd. (I trust that they will not object to some unsolicited advertising.) The 1:2 gears were of brass, Meccano type, and the 1:1 gears were of nylon as used in slot cars.

As purchased, the gears were too thick to go behind the clock face, and this is where the lathe work was necessary to turn them down to the desired thinness. This, however, was a relatively simple matter. The smaller gear



is drilled with a hole to fit snugly over the original hour-hand spindle, and if too loose it can be made a firm press-on fit by lightly hammering it in the region of the hole.

One of the 1:1 gears is drilled centrally to allow a press-on fit on to the bush of the larger gear and, if necessary, the bush can be turned down to reduce its bulk. The other 1:1 gear is a loose fit over the original hour-hand spindle, with its bush facing forwards away from the mechanism of the clock. The original hour hand is discarded, and a new one made out of thin metal in the manner shown. This is pressed over the bush of the central 1:1 gear, after the face of the clock has been replaced.

The small stud holding the idler assembly is mounted in a suitable place to one side of the central spindles, preferably in an over-size hole so that some adjustment of the engagement of the teeth of the gears can be obtained. The hole in the face will have to be

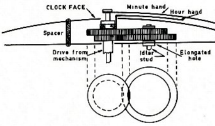


FIG. 1. MODIFICATION TO CLOCK MOVEMENT.

FIG. 2.

enlarged somewhat to accommodate the new hour hand and, if necessary, the face can be slightly dished forwards so that more space is available for the gears behind it. This can be done by placing it face down on a pad of newspapers and lightly hammering the central part. In addition, a spacer can be used to hold the face away from the body of the clock (see diagram).

Press fits are all that is necessary for the gears, as the amount of torque required to rotate the hour hand is negligible, and it is unnecessary to go to great lengths to firmly fix the appropriate parts together.

In the clock shown in the illustration, the new face was restricted to the peripheral 1½" or so by cutting a "washer" out of drawing paper. A piece of broken razor blade was attached to one limb of a pair of dividers and this was used to remove a circle of paper of sufficient size to leave the original minute markings exposed, but covering up the rest of the dial.

The position of the new numerals was then marked out in pencil and the new numerals were applied by using Letroset transfers, after which the pencil guide marks were erased. If Letroset transfers, or something similar, are not available, then stencils could be used, or even freehand for those of the more artistic amongst us. The new hour hand is, of course, enamelled black.

The only other point to watch is to not engage the gears too tightly, because, as is the case in most clock gear trains, a rather loose engagement of the teeth is desirable to avoid any tendency for binding owing to the very low driving torque available.

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R.F. CONDUCTIVITY IN ELECTRO-DEPOSITED SILVER

(continued from page 9)

derability angle a lot easier without appreciably increasing the r.f. resistance.

So you fellow Amateurs that go to all the trouble to get on 144 and then have real problems with 432 and 1296 Mc., take a good look at the quality of the finish of your conductors, make sure they are, even under a microscope, a perfect mirror finish in copper, and don't fool yourselves in having some local jobbing plater in the neighbourhood silver or nickel plate them. Decorative silver and nickel, or a combination of each, is sheer murder to r.f. Also on your h.f. and v.h.f. mobile whips, leave the nickel and chrome off, it is costing you at least 2 S points. I work a lot of mobile, maybe you have heard my signal. I am also a plater—I think I know better.

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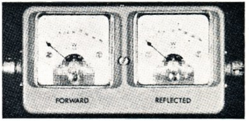
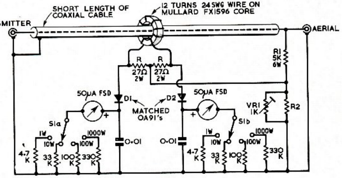
Frequency-Independent Directional Wattmeter, and an SWR Meter*



By P. G. MARTIN, B.Sc., G3PDM

THE frequency dependence problem associated with conventional reflectometers precludes their use for accurate power measurement. This arises because the transmission line voltage is sampled by a voltage divider consisting of a fixed resistance and the distributed capacitance of a length of transmission line, and because the line current is detected by an r.f. transformer consisting of a small wire loop inductively coupled to the line. In the first case the capacitive reactance varies with frequency and affects the divider ratio. In the second instance the voltage induced across the loop is proportional to the rate of change of magnetic flux around it, and therefore increases with frequency.



The sensitivity ranges given in S1a and S1b are double the correct figure. Those in the caption are correct.

Fig. 1.—Circuit of the basic Frequency-Independent Directional Wattmeter, with four ranges corresponding to full scale deflections of 0.5, 5, 50 and 500 watts in 50 ohm lines, when the value of R2 (including VR1, if fitted) should be 220 ohms. For 75 ohm systems R2 equals 150 ohms, and the calibration is different. The co-axial cable acts as an electrostatic screen between its centre conductor and the secondary winding of the toroidal transformer; the cable length is unimportant.

Both these basic failures can be corrected by the use of conventional lumped components instead of the distributed parameters of transmission lines. In particular, the voltage detector should consist of two resistors rather than an R and C, and the current detector should be a toroidal current transformer (which is a conventional transformer with a low value of load resistance across its secondary).

A basic requirement of s.w.r. bridges or directional wattmeters is to generate two voltages proportional to the forward and reflected voltages or currents of the transmission line. To achieve this one has either the current detector or the voltage detector providing two anti-phase signals so that addition and subtraction can be performed.

A FREQUENCY-INDEPENDENT DIRECTIONAL WATTMETER

M. B. Allenson, G3TGD, has designed a wattmeter using the above principles, where the low resistance in the current transformer secondary circuit is split into two equal parts. The centre connection is taken to the voltage sampling network so that sum and difference voltages are available at the ends of the transformer secondary winding (see Fig. 1).

With two meters (or an ex-Government cross-over meter) this circuit can be used as a versatile calibrated directional wattmeter. The unit also enables precise calculations of s.w.r. to be made. The prototype was accurate as a power meter from 100 Kc. to over 70 Mc., within a tolerance of 10%. With a 50 μA. meter the maximum sensitivity is better than five milliwatts; with the multiplier resistors specified in Fig. 1, full scale deflection corresponds to powers of 0.5, 5, 50 and 500 watts. Calibration is non-linear, because the meter samples voltage, and power is proportional to voltage squared. Calibration curves for 75 ohm systems are given in Fig. 2.

THE LOGARITHMIC WATTMETER

The basic instrument can be improved by including a logarithmic network so that the power range switch is redundant and a single meter scale can be used for powers from say one watt to 1,000 watts. (A logarithmic scale would have the 1, 10, 100 and 1,000 watt calibration points equally spaced; see Fig. 3). Apart from the convenience of not having to switch ranges, a logarithmic unit with two meters would enable very low s.w.r's to be measured quickly and accurately, as it is possible to measure a very low reflected power and a very high forward power simultaneously with the same percentage accuracy. To achieve this with the previous circuit would necessitate separate switches for forward and reflected sensitivities.

It is simple to add a reasonably accurate **wide-range** logarithmic network to the power meter of Fig. 1. The basis of its operation is that the voltage across a forward-biased p-n junction diode is proportional to the logarithm of the current passing through it. See **Fig. 4.** The logarithmic properties of a silicon junction diode are good over at least eight decades of current (from 5 nA. to 1 A.), which implies that a single meter scale might be calibrated over sixteen decades of power: from 1 picowatt to 10 kW.! In practice a range of 1 to 1,000 watts is more useful, so the logarithmic network must be modified (see **Fig. 5**). By introducing an insensitive meter the lower decades are condensed, but a resistor in series with the diode is necessary to restore a logarithmic form to the scale.

An experimental logarithmic directional wattmeter is shown in Fig. 6. Fig. 7 shows suitable calibration scales for this instrument, suitable for cutting out and sticking to 1-21/32 inch Japanese meters. The circuit combines the sampling networks of Fig. 1 and two logarithmic adapters as in **Fig. 5(b).**

A DIRECT READING SWR METER†

An extremely useful device, necessitating only one meter, would be an instrument giving direct indication of the standing wave ratio on a transmission line, **independent of the absolute power levels or the frequency in use.** The s.w.r. can be expressed in

* Reprinted from "Radio Communication," June 1969.

† The instrument described is the subject of a provisional patent specification.

terms of the forward and reflected voltages according to:

$$SWR = \frac{E_f + E_r}{E_f - E_r} \qquad (1)$$

where the symbols have their usual meaning. We wish to generate this function electronically, so that outputs of the two detectors can be used to generate a meter current proportional to s.w.r. This would be rather tedious, though not impossible.

Conveniently, a little manipulation of the offending equation shows that:

$$\frac{E_f}{E_r} = \frac{SWR + 1}{SWR - 1} \qquad (2)$$

which although not proportional to s.w.r., is a function of it only. Electronic division of E_f by E_r is best done by taking logarithms and subtracting. In other words,

$$\log \frac{E_f}{E_r} = \log E_f - \log E_r$$

In Fig. 5(a) the two silicon diode voltages are proportional to the logarithms of their currents, which in turn are proportional to the forward and reflected voltages. The two diode voltages can be subtracted directly by connecting a meter between them, rather than from each one to chassis (see Fig. 8).

Remember of course that the meter cannot be calibrated linearly in s.w.r., because of equation (2). The circuit doesn't take antilogs after subtracting the logs either.

The result of this is beneficial: the s.w.r. meter is increasingly sensitive as the standing wave ratio approaches 1:1. This is where one wants most sensitivity: to make the final adjustments to aerial arrays, to measure variations in s.w.r. over a band, and so on. Note that the meter reading increases as the s.w.r. improves: zero deflection corresponds to infinite s.w.r. (or no power!). The accuracy worsens if the reflected power falls below about a tenth of a watt, because of the reflected voltage detector output becoming comparable with the voltage drop across the logarithmic diode, so that the latter is no longer driven by a constant current source. This is avoidable at the expense of some frequency sensitivity by changing circuit parameters in the voltage and current sampling networks to increase their output.

A differential amplifier could be added to the circuit of Fig. 8, enabling a less sensitive meter to be used. Silicon n-p-n transistors capable of working at low collector currents should be used (e.g. 2N3707).

A PRACTICAL SWR METER

A direct-reading s.w.r. meter was built for experimental purposes around the circuit of Fig. 8. Calibration given in Fig. 10 is suitable for 75 ohm systems.

Layout of the sampling circuits is fairly critical (see Fig. 9). The input and output sockets should be set a few inches apart, and connected together with a short length of co-axial cable. The co-ax. outer must be earthed at one end only so that it acts as an electrostatic screen between the primary and secondary windings of the toroidal transformer. The primary is formed by simply threading a ferrite ring on to the co-ax. Twelve turns of 24 s.w.g. enamelled wire, equally spaced around the entire circumference of the ring form the secondary winding.

A suitable ferrite ring is the Mullard FX1596, although other types can be used. The main requirement is that the ferrite material should maintain a high permeability over the frequency range to be used.

Other components in the sampling circuits should have the shortest possible leads. R1 and R2 must be non-inductive carbon types; for high power levels (above 100 watts), R1 can consist of two or three 2-watt carbon resistors in parallel. VR1 must be a miniature skeleton potentiometer, to keep stray reactance to a minimum, although it can be dispensed with by trying various fixed resistors for R2 until the reflected indication under matched conditions is zero.

The detector diodes (D1 and D2) need to be matched point-contact types (for low capacitance and good h.f. performance) with a p.i.v. rating of 50 volts or so. Mullard OA79 or OA91 diodes are suitable. The current transformer resistors should be matched to five per cent.

Logarithmic diodes should be silicon junction types, such as conventional rectifier diodes, but they need to be matched for similar log characteristics, using the circuit of Fig. 11. P.i.v. ratings are unimportant.

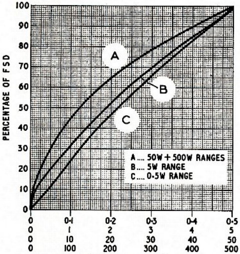


Fig. 2.—Calibration curves for the Directional Wattmeter of Fig. 1.

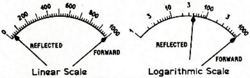


Fig. 3. (a) linear, and (b) logarithmic scales, showing the same standing wave situation; a forward power of 1 kW. and a reflected power of 40 watts. The advantages of logarithmic scales are immediately obvious.

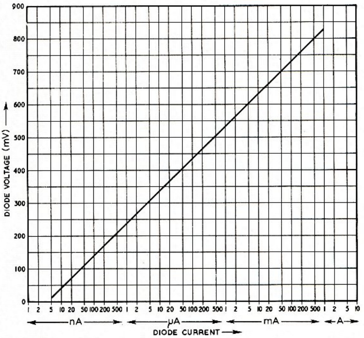


Fig. 4.—Experimental plot of the forward voltage drop across a silicon p-n junction diode (1N4006), as a function of diode current. The V/I relationship is accurately logarithmic for currents between 5 nA. and 1 amp.

In designing a toroidal transformer different to that specified, several factors must be traded against each other. As the number of secondary turns increases, the inter-turn capacitance increases and causes the response to fall at high frequencies. Failure of this nature causes the reflected voltage indication to rise; in other words the directivity of the instrument falls. If the 27 ohm resistors are raised appreciably in value, the instruments will eventually become frequency sensitive.

The ratio of the voltage sampling resistors (R1 and R2) is determined by the sensitivity of the current sensing circuit, as the two sampling voltages must be equal in magnitude under matched conditions. VR1 provides fine adjustment of the ratio. Absolute values of R1 and R2 can be varied considerably, bearing in mind that as the values decrease their dissipation increases, and that as their values increase the stray capacitance appearing across them may need to be compensated for.

USEFUL EQUATIONS

Let the line current be I amps., the line voltage be V volts, and the characteristic impedance of the transmission line in use be Z_o. Then $V = IZ_o$.

If the current transformer ratio is 1:n, and each of the resistors in its secondary circuit has a value of r ohms, then the r.f. voltage across each of these is given by:

$$V_i = \frac{Ir}{n} \qquad (3)$$

The voltage detector output is obviously

$$V_v = \frac{R_2}{R_1 + R_2} . V = \frac{R_2}{R_1 + R_2} . IZ_o$$

which is, to a good approximation,

$$V_v = \frac{R_2}{R_1} . IZ_o \qquad (4)$$

The main design equation for all the instruments is therefore

$$R_2 = \frac{r . R_1}{n . Z_o}$$

where the value for R2 includes the effect of VR1, if fitted. The dissipation of some of the components specified is quite high. For those planning to design different circuits, the following equations express the dissipation of R1 and the current transformer resistors, r.

$$W_{R1} = \frac{Z_o . W}{R_1} \text{ watts,}$$

where Z_o is the characteristic impedance of the transmission line, and W is the transmitter output power.

$$W_r = \frac{W . r}{n^2 . Z_o}$$

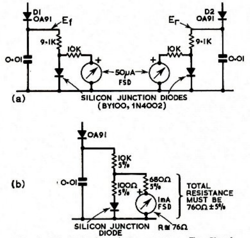


Fig. 5.—(a) Basic logarithmic converter. The 50 uA. meter and its 10 kilohm multiplier resistor form a high impedance voltmeter. With the values given, the meter sensitivity is approximately logarithmic for power levels from 10 mW. to 1 kW. (b) Circuit used to reduce the dynamic range of the logarithmic network. A calibration scale is given in Fig. 7.

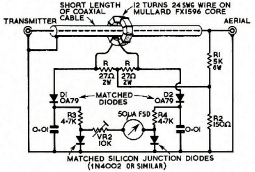


Fig. 8.—Circuit of a direct-reading power-independent s.w.r. meter for 75 ohm systems. At very low reflected power levels (s.w.r. better than about 1.005:1) the meter reading is slightly power sensitive. For this reason VR2 is adjusted for full scale deflection under matched conditions at the highest power level to be used. Fig. 10 includes a scale suitable for use with powers up to 500 watts, when VR2 and the meter resistance total about 7.5 kilohms. The logarithmic diodes (1N4002 or almost any silicon junction diode) must be matched, using the circuit of Fig. 11. VR1 may be connected across R2 as in Fig. 1.

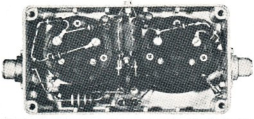


Fig. 6.—An experimental logarithmic wattmeter. Two 1-21/32 inch Japanese 1 mA. meters and their associated components will just fit into one of the smallest diecast boxes (2⅜ x 4⅜ x 1¼ inch). The toroidal transformer, 27 ohm resistors and OA91 detector diodes are mounted centrally on a small sheet of paxolin studded with "turret tags" (Radiospares).

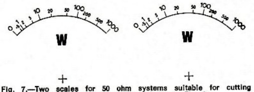


Fig. 7.—Two scales for 50 ohm systems suitable for cutting out and using on the unit shown in Fig. 6.

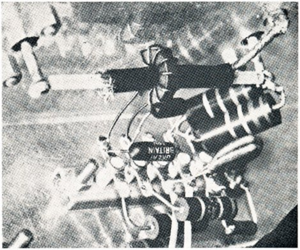


Fig. 9.—Details of the sensing circuits of the unit described in Fig. 8.

where n is the current transformer ratio. In the instruments described, W_{R1} is about 5 watts, and W_r 2 watts for a transmitter power of 500 watts.

CALIBRATION

If the linear or logarithmic wattmeters, or the direct-reading s.w.r. meter, are built exactly as described, and used in systems of the correct impedance, the calibration given in Figs. 2, 7 and 10 will be sufficiently accurate for most purposes. For those devising their own circuits, the following procedure is recommended.

Accurate calibration of any of these instruments requires a high power r.f. source (a transmitter) and an r.f. voltmeter. The instruments can be **reasonably** calibrated without the r.f. voltmeter.

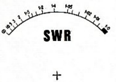


Fig. 10.—Scale for the unit shown in Figs. 8 and 9, for a 75 ohm system. The s.w.r. scale is for forward powers between 50 and 500 watts.

The wattmeters are calibrated by feeding power through the meter into an appropriate dummy load (50 or 75 ohms). VR1 is adjusted for minimum reflected power indication, and the power scale is marked according to the r.f. voltage appearing across the load.

If an r.f. voltmeter is not available, a peak-reading type can be made with a diode, capacitor and d.c. voltmeter. Alternatively, it is possible to infer the peak line voltage from the d.c. output of the forward voltage detector, which can be measured with a high impedance d.c. voltmeter. As the detector output is equal to the peak r.f. voltage applied to it, equation (4) leads to

$$V_{det} = 2.8V \frac{R_2}{R_1} = 2.8\sqrt[2]{WR} \cdot \frac{R_2}{R_1}$$

where V and W are line voltage and power as before and R is the load resistance.

It would be difficult for most Amateurs to obtain sufficient high power carbon resistors to calibrate an s.w.r. meter by means of deliberate mismatching. An indirect method is therefore proposed.

Disconnect R3 and R4 (Fig. 8) from the detectors, and connect them instead to two variable d.c. supplies. Set the supply connected to the forward circuit to +20 volts,‡ and plot the meter reading as the second voltage is carried between zero and +20 volts. The ratio of these voltages corresponds to a definite s.w.r., which can be determined from equation (1).

Before carrying out this procedure, however, VR2 should be adjusted for full-scale deflection of the meter under matched conditions at the highest level to be encountered.

CONCLUSIONS

All of the instruments described in this article have been tested under

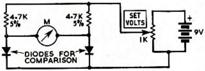


Fig. 11.—Bread-board circuit for comparing the logarithmic properties of silicon junction diodes. The meter should be as sensitive as possible (such as an Avometer on the 50 microamp. range), and should not deflect appreciably from zero as the voltage applied to the circuit is increased from zero to plus 9 volts.

actual operating conditions. Maximum power levels used varied from 100 watts at 2 Mc. and 300 watts at 28 Mc., to 1,200 watts at 3.5, 7, 14 and 21 Mc. With the components specified the instruments will sustain power levels well above the kilowatt level for periods of tens of seconds.

Anyone who has used a reflectometer (of any type) will testify to its usefulness in establishing correct loading conditions. If all transmitter output power is known to be travelling up the feeder and not being reflected at the far end, it must be radiating somewhere.

It is hoped that by introducing frequency independent directional wattmeters, one will be able to make useful comparisons of absolute power levels. The logarithmic scales are an added convenience, and the direct-reading s.w.r. meter offers a saving in meters.

The small physical size of the r.f. sampling networks makes these devices ideal for incorporating into transmitters and transceivers. All that is needed is an extra position on the main meter switch.

‡ This corresponds to a power of about 500 watts in a 50 ohm system.

Notes from Federal Repeater Secretariat

We woud like to take this opportunity to introduce ourselves to all Australian and overseas Amateurs. Following the Wodonga Conference in September last year, it was moved that personnel from VK2 would be nominated to fill this Federal position and at the last F.E. Convention in Canberra our term of office was extended for another three years.

The members who form this committee are Ian Mackenzie, VK2ZIM; Chris Jones, VK2ZDD; and Tim Mills, VK2ZTM, together with some additional help from John Rufus, VK2ZJQ, and Ross Mudie, VK2ZRQ. As a committee, we are a part of Federal Executive and our duties are the co-ordination of matters dealing with Repeaters, Translators and allied v.h.f. and u.h.f. subjects. We may be contacted either via Federal Executive or directly at P.O. Box 342, Crows Nest, N.S.W., 2065.

Our task up to now has been to establish contact with groups known to be interested in Repeaters, both in Australia and overseas, to continue the pattern of development set down at Wodonga and the last Convention, and to help frame future policies for what we hope will be the best available system for the Amateurs of Australia.

In looking back over the last 12 months it is pleasing to note that standardisation is largely being observed. In old Channel A (2 metre f.m.) areas, like VK3, most operation has moved to the National Simplex channel—Channel B (146.000 Mc.)—and new areas (VK6) have started on Channel B. All States have now started work on Repeater systems and except for a report that Southern VK7 may use Channel 3, all groups indicate that they will be using either Channel 1 or 4. (V.h.f. Notes in recent issues of "A.R." have indicated some of the channels and areas to be used.)

It would appear that Repeaters will be the next major phase of Amateur activity in this Region and other parts of the world. Most of the American magazines for the past few months have carried articles on repeaters and f.m. The A.R.R.L. have formed an expert committee to investigate their own Repeater position. The N.Z.A.R.T. are at work along similar lines to us. July "Break-In" reports that they have chosen f.m. simplex channels of 145.8, 146.0 and 146.2; as well as an a.m. Repeater on 2 metres in the Christchurch area.

On the Australian scene we will outline what we know and would ask anybody with additional information to contact us.

Applications to establish Repeaters have been submitted to the Department from Brisbane, Orange, Sydney (as well as a 6 metre a.m. system), Geelong and Hobart. At the time these notes were compiled no unattended permission had been granted.

VK2: Recent net frequency changes took place and in future Channel C will be 146.146, not 146.1; 6 metre f.m. simplex will be 52.525 Mc., not 53.950 Mc., which will be retained for W.I. C.E.N. links. A big release of low band f.m. units will help the equipment gap, both on 6 and 2 metres.

VK1: There is between 15 and 20 units operating on 52.525 in Canberra.

VK4 recently formed a State Repeater Committee with VK4ZEL as chairman and VK4ZAW as secretary. They are thinking of one Repeater for Brisbane and another for the Gold Coast area.

VK5: We understand that they will be setting up a Channel 4 system for the Adelaide area. This was a brief report from VK5ZDY who passed through Sydney recently.

VK6: Graham VK6ZDB advised that some operation had started on Channel B in the Perth area and, together with Mac VK6MM, will be building a Channel 1 Repeater for the West.

The Repeater Secretariat is working on a small publication of all information we can gather to help in the establishment of Repeaters and advice will be given through this column when it is available. By the time you read this report there could be some changes in the above information, due to the time lag between the closing date of notes and the issue of "A.R." If you have any information please send it early in November and we will try and get it in the January issue.

—Federal Repeater Secretariat.

CIRCUIT BOARDS FROM ODDS AND ENDS

T. W. BARNES, VK2ABI*

Trial "hook-up" of circuit elements or even the permanent wiring of some circuit or device may be nicely managed without the use of matrix board, backed or unbacked, or of circuit board. This may be done by the use of various lugs available from at least two sources and of insulating sheet; apart from the lugs some specialised tools and punches are available.

Formica or other finishing sheet of similar kind available is apparently based on bakelite; Formica has been found very satisfactory. This material may be left over from some job, or may be purchased as an off-cut. Insulation resistance is very high.

Many of the plastic bottles sold containing half a gallon of detergent are also good insulating material, apparently polyethylene or polybutylene. With a sharp pair of scissors a useful piece of sheet can be cut from one of these bottles. Perspex sheet is also useful.

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Formica and Perspex can readily be cut by first scoring with a file, ground to a chisel edge. After clamping the sheet between suitable blocks, a sharp bend will break the sheet along the score mark. Formica breaks more cleanly when the sheet is scored on each face at the position of the cut.

Components are fixed by use of the various lugs available from Zephyr or elsewhere. Two particularly useful lugs are the smallest plain eyelet and the tagged eyelet (Fig. 1); however, other types are available for special purposes.

These two lugs are of a length suitable for 1/16" sheet. To fix them, a hole is drilled in the sheet with a number 41 drill. An eyelet is inserted through the sheet and placed with its head against a flat steel surface. The open end may then be lightly swelled with a centre punch. If the lightly swelled end is now placed against the steel surface, another light blow with the centre punch will neatly flatten the open end of the eyelet and tighten it on the sheet. There are special tools for this and other operations.

Where many holes are needed a drilling jig can be made from 1/8" mild steel plate, through which a 41 drill quickly and accurately locates the position of the holes. Carefully "laid out" and made, one jig permits quite long rows of holes to be drilled, as shown in Fig. 2. This figure shows the clock portion of a counter and the lugs ready placed for the wiring of a gated flip-flop. Point to point wiring and component placement may be above and/or below the board.

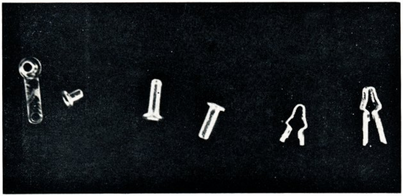

Fig. 1.

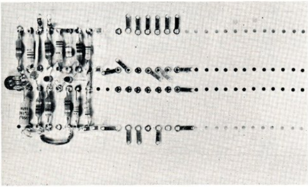

Fig. 2.

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Retirement of Mr. Carroll

Late in September a presentation was made to Mr. Charles Carroll, who was Controller Radio Branch until his recent retirement. The occasion was the Annual Dinner of the VK3 Division. Among those present were Senior Officers of the Postmaster General's Department and members of Federal Executive. Michael Owen, VK3KI, Federal President of the W.I.A., made the presentation of a suitably inscribed desk set to Mr. Carroll.

Mr. Carroll will be remembered as being the chief Post Office negotiator when the new Handbook was being discussed and has been responsible for the many privileges recently afforded the Australian Amateur Service following Institute representation, as for example, beacon and v.h.f. repeater operation.

New Equipment

SOLID STATE 4-BAND RECEIVER

Weston Electronics Pty. Ltd. have recently introduced to Australia an all solid-state 4-band communications receiver that is creating more than unusual interest for a number of reasons. Known as the Realistic DX150, this receiver features a wide performance spectrum. Another outstanding feature is its ability to operate from a variety of power sources: from a.c. mains, or, dry cells—if current fails or is not available, it will also operate from a car cigarette lighter or any 12v. d.c. source.

Technically the Realistic DX150 is a single conversion, four bands, superhet., tuned r.f. stage, two i.f. stages, full wave product detector for s.s.b.-c.w., fast and slow a.g.c., variable pitch b.f.o., illuminated electrical bandspread, fully calibrated for Amateur bands, cascade r.f. stage, a.n.l. for r.f. and a.f., zener stabilised, o.t.l. audio, illuminated S meter, built-in monitor speaker, frequency range 0.535 Mc. to 30 Mc., front panel antenna trimmer, r.f. gain control, operation from 240v. a.c. or 12 volts d.c., eight D type dry cells give approximately 100 hours continuous operation. Dimensions: 6½" h. x 14" w. x 9" d.; weight 17 lbs.

Housed in attractive grey metal cabinet with substantial polished metal front panel and solid metal knobs, the Realistic DX150 is a classic example of "handsome is as handsome does," it looks good and performs accordingly.

Literature is freely available from Weston Electronics Pty. Ltd., 376 Eastern Valley Way, Roseville, N.S.W., 2069.

HORWOOD R.F. INSTRUMENTS

Two new r.f. test instruments that will find ready acceptance by Amateurs and commercial users, are the PM502/T r.f. power meter, and the SW502 v.s.w.r. meter. These units are small in size, both offering portability, due to their light weight and small size, making each ideal for field day experiments and mobile application. They are designed specifically for assessing the performance of experimental circuits, transmission lines and antenna systems. Detailed specifications are featured in Radio Parts' advertisement on the back cover of this issue.

QUARTER CENTURY WIRELESS ASSOCIATION

A meeting was hed on Wednesday night, 17th September, 1969, at The Combined Services Club, 5 Barrack St., Sydney, wherein the Sydney chapter of the above Association was inaugurated.

The following officers were elected: H. Caldercott, VK2DA, chairman; G. Wilson, VK2-AGO, secretary; B. Anderson, VK2AND, treasurer.

It was decided to hold a monthly dinner get-together on the first Wednesday of each month, January excepted, at 6.30 p.m. at the Combined Services Club, 5 Barrack St., Sydney.

Any Amateur who has held a licence for twenty-five years or more is welcome to join. The subscription is: joining fee $3.00, 3-year subscription $5.00 or life membership $8.00. For further particulars, phone the Secretary, at Sydney, telephone 43-2427, or write to 31 Glenview Street, Greenwich, N.S.W., 2065.

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PROVISIONAL SUNSPOT NUMBERS

JULY 1969

Day	R	Day	R
1	106	16	64
2	111	17	71
3	167	18	66
4	155	19	59
5	131	20	54
6	130	21	55
7	103	22	51
8	121	23	43
9	114	24	51
10	112	25	43
11	109	26	49
12	98	27	49
13	92	28	79
14	69	29	84
15	71	30	90
		31	128

Mean equals 87.9.

—Swiss Federal Observatory, Zurich.

AUSTRALIS OSCAR 5 LAUNCH IMMINENT

The launching into orbit of the first Australian-built Amateur Radio satellite, **Australis Oscar 5** is now expected to take place about the middle of November.

A summary of the **Australis Oscar** project appeared in "A.R." last month. One important change has occurred since that summary was published. A problem has arisen with the command receiver in the satellite and it will not be possible to command the 29.450 Mc. transmitter on and off. For this reason, both of the satellite's transmitters will operate continuously from launch until the end of the satellite's active life. Because of this, it is expected that **Australis Oscar 5** will transmit for three to four weeks after launch. This, of course, makes it most important that Amateurs intending to track the satellite should be ready to do so when it goes up, rather than a week or two afterwards.

The latest news on the launching date can be obtained by listening to the W.I.A. weekly Divisional broadcasts, by participating in the Australis skeds on 3555 Kc. at 1000 GMT each Friday or by contacting the Oscar State Co-ordinators. The State Co-ordinators have information available on when the satellite will be audible to Amateurs and S.w.l's in Australia. The names of the State Co-ordinators appeared in October "A.R.," on page 7.

Book Review

ADVANCED TECHNIQUES FOR TROUBLESHOOTING WITH THE OSCILLOSCOPE

Robert L. Goodman

Here is a practical guidebook on using modern scopes, including those employing triggered-sweep and dual-trace capabilities. As many progressive technicians have learned, a triggered-sweep scope is an invaluable aid in locating circuit troubles in modern electronic equipment. No longer a luxury item, it is a vital link in efficient, profitable troubleshooting.

A triggered-sweep scope belongs in every t.v. shop, and there are models priced within the budgets of most t.v. shops. This book describes several reasonably-priced models (including a kit type), how they work, and how they can be used to cut down troubleshooting time. The book shows how to interpret waveform displays (with over 100 photos), and how to employ the advantages of a single-or dual-trace triggered sweep in tube-type or solid state circuits.

Despite the emphasis on triggered sweep, most of the troubleshooting procedures described can be performed with a standard service scope. Triggered-sweep just makes the job easier.

For openers on practical applications, the author suggests stereo troubleshooting procedures, f.m. multiplex tests and alignment, separation and subcarrier phase checks, and "complementary symmetry" solid state stereo amplifiers. Chapter 7 gets down to the brass tacks of solid state servicing—the do's and don'ts as they apply to specific circuits—including pulse and squarewave tests for transistor and IC circuits. Also described is a simple inexpensive curve-tracer for solid state component checks.

Triggered-sweep scope applications in video i.f. and remote control circuit alignment are covered in Chapter 9, including Zenith's "speed aligner" generator. The author describes i.f. and trap adjustment, colour bandpass alignment, and overall v.h.f. tuner i.f. checks, as well as f.m. receiver alignment and tuner tracking. Chapter 10 goes into colour receiver troubleshooting, with many case histories of horizontal output circuit troubles, boost amplifier "spooks," burst amplifier checks, colour oscillator a.f.c. defects, etc. In this age of increasingly complex electronic devices, this book will help the reader become familiar with the use of a triggered scope in a minimum amount of time, thus preparing him not only for the present but for what lies ahead.

256 pages, 267 illustrations, 11 chapters. Price $US7.95 hardbound, $US4.95 paper.

HOW TO FIX TRANSISTOR RADIOS AND PRINTED CIRCUITS

Leonard C. Lane

Here is a completely updated, revised edition of the famous best-selling classic on transistor radio repair—a totally new, second edition of an all-time best seller. In addition to extensive enrichment and re-arrangement of the first edition, the author brings FETs, zener diodes, f.m. radios—in fact, everything related to the current state of the art—into the picture. Here's the perfect reference and guide for electronic technicians who need to understand and repair semiconductor circuits efficiently. For beginners, this single volume provides the practical knowledge needed to fix any transistor radio.

For those interested in transistor physics, fundamentals are emphasised in the first two chapters. Chapter 2 explains how transistors are "put together," and introduces basic circuits. The real "meat" begins in chapter 3 which thoroughly covers amplifier fundamentals, basic circuit configurations, biasing, FETs, JFETs and IGFETs. The next two chapters are devoted to r.f. and i.f. amplifiers, detector and a.g.c. circuits, plus more advanced radio circuits, including output stages. Chapter 6 concentrates on auto radios and chapter 7 on f.m. radios. In describing each type of receiver, the author begins his description at the "front end" and "works" through to the output stages.

The next three chapters explain solid state servicing, repair techniques, measurements, transistor testing, and alignment, while chapter 11 covers the same categories in regard to printed circuits. Chapter 12 presents numerous troubleshooting charts designed to help locate and repair all common complaints in transistor radios.

256 pages, over 150 illustrations, 12 big chapters. Price: $US7.95 hardbound, $US4.95 paperbound.

REMEMBRANCE DAY CONTEST RESULTS

TASMANIA WINS R.D.

To Tasmania for the second year in succession goes the honour of winning the R.D. Contest. Their high percentage of participation and high State points kept them on top. This year's highest scorer, VK9DJ, entered a log of 1,969 points for approximately 22 hours of operation. Quite an effort to help his Division.

—Neil Penfold, F.C.M., for F.C.C.

DETAILS OF DIVISIONAL SCORES

Division	Log Entry	Licensees	% Participation	Average Top Six Logs	Points per Contact of Top Six Logs	Total State Points	State Score
VK2+1+9	111	1,972	5.6	1,071	2.7	32,948	2,926
VK3	82	1,785	4.6	781	2.2	21,014	1,746
VK4+9	79	752	10.7	1,276	2.9	33,463	4,544
VK5+8	89	769	11.4	1,024	2.1	25,337	3,920
VK6+9	56	436	12.4	916	2.4	17,456	3,083
VK7	59	238	24.7	1,068	2.2	15,810	4,987

DIVISIONAL TROPHY WINNER

TASMANIA

NEW SOUTH WALES

(including A.C.T. and Norfolk Island)

Transmitting Phone (a)

VK2ASZ	1256 Pts.	VK2EY	209 Pts.
1JG	1105 ,,	2BMK	204 ,,
2XT	1054 ,,	2KA	198 ,,
2AD	1015 ,,	2RU	143 ,,
1VP	1002 ,,	2GV	135 ,,
1AN	991 ,,	1JL	126 ,,
2TS	848 ,,	1DR	119 ,,
2YN	816 ,,	2BNA	116 ,,
2DM	794 ,,	2BNK	114 ,,
2ABA	776 ,,	2GN	109 ,,
2BGF	754 ,,	2CU	105 ,,
2AKX	696 ,,	2PN	104 ,,
2AJY	677 ,,	2UJ	90 ,,
2APP	662 ,,	1EM	85 ,,
2SB	653 ,,	1WT	84 ,,
2APQ	651 ,,	2AND	83 ,,
2FM	636 ,,	2BJT	74 ,,
2RX	613 ,,	2ABC	71 ,,
2ATT	600 ,,	2ZCF	70 ,,
2ADJ	595 ,,	2SG	55 ,,
2AMM	571 ,,	2AIM	55 ,,
2DK	549 ,,	2AFY	50 ,,
2AXL	506 ,,	2AAH	50 ,,
2RB	462 ,,	2AOX	48 ,,
2BDB	456 ,,	2AKL	44 ,,
2CK	455 ,,	2AKV	43 ,,
2AGF	454 ,,	1CR	42 ,,
2ADA	414 ,,	2ZCT/P	41 ,,
2AFD	407 ,,	2DO	37 ,,
2BKM	396 ,,	2AAT	33 ,,
2AEO	366 ,,	2RP	31 ,,
2BHD	349 ,,	2ZVF	28 ,,
1AOP	339 ,,	1ZWP	25 ,,
2QZ	332 ,,	1DA	23 ,,
2AKO	319 ,,	4ZLO/P	21 ,,
2CN	302 ,,	2IJ	19 ,,
1LF	300 ,,	2CS	18 ,,
1RY	296 ,,	1ZMR	18 ,,
2AJL	296 ,,	1ZTA	18 ,,
2MW	280 ,,	2AUC	17 ,,
2AXJ	279 ,,	2ZPC	17 ,,
2FC	265 ,,	2ZIC	15 ,,
1MR	256 ,,	1ZRH	15 ,,
2ACD	246 ,,	2ZKF/P	13 ,,
2AEC	237 ,,	1ML	13 ,,
2AWN	227 ,,	1ZRN	11 ,,
2WT	211 ,,	1RD	6 ,,
2AIC	211 ,,	2ZTQ	5 ,,

Transmitting C.W. (b)

VK2QL	405 Pts.	VK2ZO	120 Pts
2VN	292 ,,	2RJ	116 ,,
2BF	255 ,,	2PQ	105 ,,
2HW	172 ,,	2IC	47 ,,
2RA	157 ,,	2JY	30 ,,
2BKH	148 ,,	2HZ	19 ,,

Transmitting Open (c)

VK2BO	1173 Pts.	VK1AR	365 Pts.
2PU	519 ,,		

VICTORIA

Transmitting Phone (a)

VK3VK	880 Pts.	VK3HE	205 ,,
3ADW	817 ,,	3EF	203 ,,
3AMK	764 ,,	3AR	178 ,,
3AXM	750 ,,	3AOW	148 ,,
3WW	749 ,,	3PR	137 ,,
3AXV	724 ,,	3AAJ	128 ,,
3AUJ	706 ,,	3ZX	114 ,,
3AGF	655 ,,	3WIA	103 ,,
3JI	655 ,,	3ASV	100 ,,
3AUL	650 ,,	3FJ	95 ,,
3ASQ	627 ,,	3PW	94 ,,
3AYF	592 ,,	3ARO	89 ,,
3RV	583 ,,	3UG	76 ,,
3KI	501 ,,	3DY	76 ,,
3BA	433 ,,	3AUO	73 ,,
3AOS	432 ,,	3AER	58 ,,
3WK	373 ,,	3VF	46 ,,
3YQ	369 ,,	3AFI	40 ,,
3IZ	335 ,,	3LV	37 ,,
3ASN	332 ,,	3AJP	36 ,,
3SM	331 ,,	3AIS	32 ,,
3OP	327 ,,	3AEL	31 ,,
3BBB/T	311 ,,	3ZCJ	29 ,,
3EG	272 ,,	3ZPP	28 ,,
3QZ	270 ,,	3ZBB	26 ,,
3AVR	263 ,,	3WQ	25 ,,
3QV	262 ,,	3ALP	12 ,,
3AUN	254 ,,	3ADP	9 ,,
3ASI	231 ,,	3ZBI	5 ,,
3AMO	216 ,,	3RA	5 ,,
3RZ	212 ,,	3ZVJ	5 ,,

Transmitting C.W. (b)

VK3XY	278 Pts.	VK3AMA	127 Pts.
3APN	277 ,,	3ACA	101 ,,
3AUT	214 ,,	3AXK	72 ,,
3AUH	200 ,,	3RJ	69 ,,
3IB	141 ,,		

Transmitting Open (c)

VK3QI	687 Pts.	VK3QP	99 Pts.
3ARM	481 ,,	3YO	92 ,,
3CDR	275 ,,	3JU	36 ,,
3YC	256 ,,	3ABA	30 ,,
3XB	246 ,,		

QUEENSLAND

(including Christmas Island)

Transmitting Phone (a)

VK9DJ	1969 Pts.	VK4LZ	908 Pts.
4EQ	1312 ,,	4GI	885 ,,
4LT	1283 ,,	4NO	801 ,,
4WW	1279 ,,	4LJ	792 ,,
4DP	908 ,,	4LB	758 ,,

Transmitting Phone (continued)

VK4LE	728 Pts.	VK4SA	88 Pts.
4XY/P	660 ,,	4RZ	86 ,,
9BK	649 ,,	4EH	81 ,,
4FA/P	640 ,,	4XV	78 ,,
4FH	587 ,,	4JI	74 ,,
4UC	559 ,,	4LO	72 ,,
4KH	537 ,,	4ZW	72 ,,
4RF	531 ,,	4GG	69 ,,
4FN	516 ,,	4QW	68 ,,
4MW	473 ,,	4XJ/M	64 ,,
9RY	408 ,,	4FP	56 ,,
4SF	389 ,,	9BS	56 ,,
4ZT	378 ,,	4LN	32 ,,
4HW	353 ,,	4GT	31 ,,
4DZ	328 ,,	4NV	30 ,,
4ES	315 ,,	4BQ	29 ,,
4NP	315 ,,	4TC	29 ,,
9WD	313 ,,	4QT	28 ,,
4PJ	303 ,,	4VJ	27 ,,
4WY	286 ,,	4TK	27 ,,
4NS	262 ,,	4JW	26 ,,
4RE	253 ,,	4AQ	21 ,,
4BL	233 ,,	4VX	21 ,,
4SR	215 ,,	4ZZ	20 ,,
4BG	193 ,,	4KS	19 ,,
4OF	191 ,,	4XZ	16 ,,
4CZ	183 ,,	4UG	16 ,,
4MJ	157 ,,	4ZJE	12 ,,
4QA	117 ,,	4ZAL	7 ,,
4HZ	106 ,,	4AR	6 ,,

Transmitting C.W. (b)

VK4KX	445 Pts.	VK4MY	86 Pts.
4LV	367 ,,	4KK	35 ,,
4XW	252 ,,	4DU	32 ,,
4XP	157 ,,		

Transmitting Open (c)

VK4DB	658 Pts.	VK4GW	335 Pts.
4UA	352 ,,		

SOUTH AUSTRALIA

(including Northern Territory)

Transmitting Phone (a)

VK5FT	1160 Pts.	VK5PB	104 Pts.
5NN	1103 ,,	5JC	99 ,,
5BI	1039 ,,	5DO	94 ,,
5QX	982 ,,	5ZX	67 ,,
5TY	973 ,,	5TW	66 ,,
5EJ	885 ,,	5TU	60 ,,
5EF	870 ,,	5MS	60 ,,
5ZK	853 ,,	5KC	60 ,,
5XW	808 ,,	5RR	55 ,,
5LN	663 ,,	5ZKK	52 ,,
5GZ	645 ,,	5KY	43 ,,
5GV	559 ,,	5XY	42 ,,
5AX	454 ,,	5ZNH	42 ,,
5FL	446 ,,	5VA	41 ,,
5LP	353 ,,	5GF	39 ,,
8CM	329 ,,	5ZDX	32 ,,
5VL	312 ,,	5UC	25 ,,
5EK	271 ,,	5ZBT	22 ,,
5HH	252 ,,	5ZBU	21 ,,
5GM	215 ,,	5DF	21 ,,
5CY	183 ,,	5CA	16 ,,
5IF	179 ,,	5KO	16 ,,
5PH	177 ,,	5ZFJ	14 ,,
5MF	174 ,,	5ZRG	13 ,,
5LQ	167 ,,	5ZQ	11 ,,
5UF	137 ,,	5ZWW	7 ,,
5LC	121 ,,	5ZHM	6 ,,
5VB	118 ,,	5CJ	5 ,,
5ZA	115 ,,		

Transmitting C.W. (b)

VK5XK	322 Pts.	VK5LD	122 Pts.
5FH	249 ,,	5HO	113 ,,
5PC	162 ,,	5TL	79 ,,
8HA	161 ,,	5MZ	66 ,,
5OR	156 ,,	5RK	31 ,,
5AU	149 ,,	5JG	21 ,,
5MY	133 ,,	5KU	17 ,,
5LF	125 ,,		

Transmitting Open (c)

VK5GW	1172 Pts.	VK5HM	285 Pts.
5FO	1167 ,,	5NJ	269 ,,
5KG	995 ,,	5RG	264 ,,
5PF	621 ,,	5DV	244 ,,
8KK	561 ,,	5WI	241 ,,
5FM	536 ,,	5WN	140 ,,
5CV	378 ,,	5FY	91 ,,
5WO	376 ,,	5QR	66 ,,
5VW	349 ,,		

WESTERN AUSTRALIA

(including Papua-New Guinea)

Transmitting Phone (a)

VK6CT	931 Pts.	VK6AO	164 Pts.
6ID	812 ,,	6TS	156 ,,
6TR	782 ,,	6DC	154 ,,
6ZK	740 ,,	6TU	136 ,,
6TG	705 ,,	6WD	131 ,,
6DT	694 ,,	6RG	124 ,,
6DA	683 ,,	6TX	92 ,,
6KK	370 ,,	6WL	90 ,,
6KM	360 ,,	6KN	53 ,,
6WY	355 ,,	6WI	31 ,,
6NM	352 ,,	6ZDB	30 ,,
6FG	314 ,,	6XW	27 ,,
6CA	304 ,,	6MO	23 ,,
6BT	276 ,,	6GL	22 ,,
6JY	254 ,,	6XY	22 ,,
6TB	245 ,,	6TM	22 ,,
6EP	219 ,,	6MM	20 ,,
6XX	204 ,,	6ZBT	14 ,,
6GR	178 ,,	6ZEQ	7 ,,
6DI	175 ,,		

Transmitting C.W. (b)

VK6WT	472 Pts.	VK6CR	49 Pts.
6AJ	82 ,,	6GA	33 ,,
6ZZ	50 ,,		

Transmitting Open (c)

VK6CW	1136 Pts.	VK6JK	367 Pts.
6BE	1031 ,,	6QJ	280 ,,
6MA	818 ,,	6ZW	237 ,,
6RU	726 ,,	6OV	265 ,,
9XI	598 ,,	9DR	230 ,,
6ED	573 ,,	6AI	52 ,,

TASMANIA

Transmitting Phone (a)

VK7AZ	1236 Pts.	VK7PF	133 Pts.
7KJ	1180 ,,	7IL	118 ,,
7JV	1173 ,,	7FM	117 ,,
7TX	1164 ,,	7AB	79 ,,
7FB	836 ,,	7UV	68 ,,
7MD	819 ,,	7SF	50 ,,
7RC	788 ,,	7UX	43 ,,
7KK	666 ,,	7JD	40 ,,
7ZX	581 ,,	7MR	34 ,,
7WF	534 ,,	7ZRO	33 ,,
7PA	477 ,,	7HJ	32 ,,
7RZ	472 ,,	7ZMS	30 ,,
7EJ	270 ,,	7JO	25 ,,
7WH	262 ,,	7PS	24 ,,
7NC	262 ,,	7ZOR	21 ,,
7KH	206 ,,	7LZ	19 ,,
7JF	192 ,,	7DR	18 ,,
7LS	186 ,,	7WK	17 ,,
7DK	178 ,,	7ZTG	15 ,,
7MX	173 ,,	7LD	14 ,,
7BM	161 ,,	7BQ	12 ,,
7EB	150 ,,		

Transmitting C.W. (b)

VK7CH	287 Pts.	VK7KS	48 Pts.
7GC	248 ,,	7BJ	48 ,,
7MZ	175 ,,	7JB	27 ,,
7RR	140 ,,	7GV	25 ,,
7LJ	128 ,,	7YL	15 ,,
7CM	117 ,,	7KA	14 ,,
7RY	100 ,,		

Transmitting Open (c)

VK7ZZ	750 Pts.	VK7OM	56 Pts.
7AL	720 ,,		

AUST. CAPITAL TERRITORY

Transmitting Phone (a)

VK1JG	1105 Pts.	VK1WT	84 Pts.
1VP	1002 ,,	1CR	42 ,,
1AN	991 ,,	1ZWP	25 ,,
1AOP	339 ,,	1DA	23 ,,
1LF	300 ,,	1ZTA	18 ,,
1RY	296 ,,	1ZMR	18 ,,
1MR	256 ,,	1ZRH	15 ,,
1JL	126 ,,	1ML	13 ,,
1DR	119 ,,	1ZRN	11 ,,
1EM	85 ,,	1RD	6 ,,

Transmitting Open (c)

VK1AR .. .. 365 Pts.

NORTHERN TERRITORY

Transmitting

VK8KK	561 Pts.	—Open
8CM	329 ,,	—Phone
8HA	161 ,,	—C.W.

PAPUA-NEW GUINEA AND TERRITORIES

Transmitting Phone (a)

VK9DJ	1969 Pts.	—Score to VK4
9BK	649 ,,	,, ,, ,,
9RY	408 ,,	,, ,, ,,
9WD	313 ,,	,, ,, ,,
9BS	36 ,,	,, ,, ,,

Transmitting Open (c)

VK9XI	598 Pts.	—Score to VK6
9DR	230 ,,	,, ,, ,,

LISTENERS' SECTION

VK2	L3377/2—T. Hambling	848 Pts.
	L2022—D. Grantley	537 ,,
	L2074—J. Hilliard	513 ,,
	R. Carter	502 ,,
	L2161—C. Kilduff	471 ,,
	L2259—P. Vernon	378 ,,
	S. Voron	350 ,,
	L2033—D. Shepard	150 ,,
	A. Peters	134 ,,
	R. Davis	Incorrect Log
VK3	St. Paul's College R.C.	1053 Pts.
	R. Hanel	763 ,,
	A. Cox	611 ,,
	M. Batt	516 ,,
	M. Cox	483 ,,
	P. Barker	451 ,,
	E. Trebilcock	266 ,,
	G. Earl	217 ,,
	R. Major	101 ,,
	Traralgon Tech. R.C.	Incorrect Log
	K. Wood	Incorrect Log
VK4	C. Kenny	864 Pts.
	K. Cunningham	741 ,,
	M. Joyce	573 ,,
	E. Moore	399 ,,
	C. Thorpe	302 ,,
	G. Franks	89 ,,
VK5	L. Earl	1677 Pts.
	S. Ruediger	1342 ,,
	T. Hannaford	502 ,,
	R. Edmeades	416 ,,
	R. Walpole	202 ,,
VK6	P. Drew	1576 Pts.
	R. Wake	350 ,,
	D. Smedley	113 ,,
VK7	R. Mutton	1318 Pts.
	A. Dixon	1031 ,,
	B. Livingston	928 ,,
	R. Everett	906 ,,

ANALYSIS OF R.D. RESULTS

TOP SIX LOGS

VK2ASZ	1256 Pts.	429 Contacts
1JG	1105 ,,	431 ,,
2XT	1054 ,,	336 ,,
2AD	1015 ,,	367 ,,
1VP	1002 ,,	385 ,,
1AN	991 ,,	426 ,,
	6423 Pts.	2374 Contacts
VK3VK	880 Pts.	383 Contacts
3ADW	817 ,,	334 ,,
3AMK	764 ,,	312 ,,
3AXM	750 ,,	350 ,,
3WW	749 ,,	329 ,,
3AXV	724 ,,	316 ,,
	4684 Pts.	2024 Contacts
VK9DJ	1969 Pts.	685 Contacts
4EQ	1312 ,,	463 ,,
4LT	1283 ,,	400 ,,
4WW	1279 ,,	392 ,,
4DP	908 ,,	311 ,,
4LZ	908 ,,	330 ,,
	7659 Pts.	2581 Contacts
VK5FT	1160 Pts.	448 Contacts
5NN	1103 ,,	461 ,,
5BI	1039 ,,	417 ,,
5QX	982 ,,	393 ,,
5TY	973 ,,	409 ,,
5EJ	885 ,,	355 ,,
	6142 Pts.	2483 Contacts
VK6CW	1136 Pts.	484 Contacts
6BE	1031 ,,	477 ,,
6CT	931 ,,	388 ,,
6MA	818 ,,	354 ,,
6ID	812 ,,	350 ,,
6TR	782 ,,	339 ,,
	5510 Pts.	2296 Contacts
VK7AZ	1236 Pts.	579 Contacts
7KJ	1180 ,,	537 ,,
7JV	1173 ,,	514 ,,
7TX	1164 ,,	502 ,,
7FB	836 ,,	365 ,,
7MD	819 ,,	421 ,,
	6408 Pts.	2918 Contacts

MODE OF TRANSMISSION

From a sample of 365 logs entered in the Contest, of interest perhaps is the following breakdown of stations' mode of operation:—

	SSB	AM	Mode Not Shown
VK2	65	7	8
3	45	14	8
4	58	8	5
5	39	10	13
6	36	2	6
7	33	5	3
	276	46	43

That is 76% used SSB, 12.6% used AM, and 11.4% didn't indicate the type of emission on their log.

☆

CONTEST CALENDAR

9th Nov.: International OK DX Contest (c.w. only).
8th/9th Nov.: R.S.G.B. 7 Mc. Contest (phone).
29th/30th Nov.: "CQ" W.W. DX Contest (c.w.).
6th Dec. '69 to 11th Jan. '70: Ross A. Hull V.h.f. Memorial Contest.
6th/7th Dec.: C.H.C. International DX Contest (c.w.).
13th/14th Dec.: C.H.C. International DX Contest (s.s.b.).
7th/8th Feb.: *John M. Moyle National Field Day.
7th/8th Feb.: 36th A.R.R.L. International DX Competition (1st phone week-end).
21st/22nd Feb.: 36th A.R.R.L. International DX Competition (1st c.w. week-end).
7th/8th March: 36th A.R.R.L. International DX Competition (2nd phone week-end).
21st/22nd March: 36th A.R.R.L. International DX Competition (2nd c.w. week-end).

*N.B.—The dates given previously for the Field Day Contest (1st/2nd Feb.) were incorrect. The dates above are correct.

Overseas Magazine Review

Compiled by Syd Clark, VK3ASC

Shortly after I began doing "odd jobs" for the Editor of "A.R." he handed me a pile of overseas magazines and asked me to check them and suggest articles which would be suitable for reprinting. The magazines were duly culled and an index of the contents transcribed onto paper together with comments and suggestions. To my very great surprise, I found the "resume" published as a review in "A.R." Some readers have been kind enough to read what had been written and some of them even commented favourably on the writings and so the "review" has been turned into a regular feature, not only in "A.R." but also on the W.I.A. Victorian Division Sunday morning broadcasts. It is heartening to the writer to know that his fellow Amateurs find something to interest them in the reviews from time to time and the hours spent compiling the notes will have been well spent if the level of knowledge in the Amateur ranks is improved thereby. To those who have commented favourably—THANK YOU.

"QST"

August 1969

More Power on 144 Mc. with Transistors, WA6BWP. Getting above the milliwatt level with solid state devices.

Fixing the Station Receiver, K4IPV. Some useful pointers on making success of a failure. Various methods of fault-finding are discussed.

A Frequency Counter with Binary Coded Decimal Readout, WB2MEX. A reasonably simple device using a handful of ICs to count to 9 Mc.

Long Wire Inverted Vee Antennas and Tuner, W3FQJ. The author of this article describes how to make simple "droopy dipoles" operate on a number of bands with low impedance feed.

A Modification for the Heath HD-10 Electronic Keyer, K1TVF.

Building a Novice Rig from an old TV Set. W1ICP describes how to build a 75 watt transmitter for c.w. operation on 80, 40 and 15 metres. The only part of the t.v. set he appears to have made use of is the power supply.

Fast and Easy Printed Circuit Boards, W8EYM. The title is self explanatory.

D.C. Voltages and the PI Network, W4PPB. This author raises a point which is often not clearly explained in pi network design data. Most designers recommend the use of an r.f. choke between the antenna terminal and earth. W8EYM suggests this is not the only reason.

College Competition — Impending Disaster, K4FW. Perhaps they indulge in different sorts of activities at American colleges?

The New Ham Alphabet, W7RGL. The most up-to-date Amateur jargon.

"BREAK-IN"

August 1969

It is the New Zealand practice for various clubs and divisions of the N.Z.A.R.T. to take the responsibility for the technical content of various issues of their magazine. This issue has been produced by the "Central Institute of Technology" at Petone, near Wellington.

Instant Audio, ZL2AMJ. Using a TAA300 IC.

A Solid State Phase Modulator, ZL2ACF. If you have an a.m. 144 Mc. transceiver and want to use it on the f.m. net, this is for you.

OP HR QLZ (Operator Lazy), ZL2AVK describes a simple way of avoiding four or five switches for transmit receive change over.

The New Improved Double-Action, Large Economy Size Speaking Vertical by Zerstreut Verruckte. The writer of this article must have been innoculated with a gramophone needle. A sort of super-Joystick!

The CIT Signal Injector, ZL2ALC. The multivibrator again, BC107, BC177, cell, switch and little else.

A Simple Electronic Keyer, and it's cheap, ZL2AVK. The only one transistor keyer in the literature.

PC Layout Enlargement, ZL2ARP. For those who find the standard p.c.b. too small.

A Crystal Substandard using Integrated Circuits, ZL2ACF. This unit produces outputs at 500 Kc. intervals throughout the spectrum and uses two SN17819, one SN17911 integrated circuit and a 2N3826 buffer.

"CQ"

July 1969

Slow Scan Television, W9NTP, Part 1. Described as a new frontier of Amateur communication. This article even includes a picture which was received by VK3AHR on 20 metres.

Swiss Radio Amateurs Help the International Committee of the Red Cross to Help Humanity, HB9SI, 4U1SU, etc. Describes one way that Amateur Radio is serving society.

Transmission Lines, David P. Costa. Describes the various types, compares performance, etc.

Separate KW. Amplifiers for the Contest Man, K9LKA and W6SAI. One for each band with a 4/1000A.

Integrated Circuit R.F. Pre-amplifier, W2EEY. A small IC is the heart of this cascode r.f. amplifier that may be used for single or multiband operation. Can be operated from a variety of power sources. IC used, PA-713.

Resistance Tuning Crystal B.F.O. Oscillators, W2EEY. Using resistance variation to directly change the crystal oscillator frequency. The method is capable of being used directly at the oscillator or by using an FET as the resistance element; can be remotely controlled.

Weather Warnings with V.H.F. Receivers, W9VCL. Describes a method of detecting approaching storms using a v.h.f. receiver.

Twin Lead Multiple Dipoles and Vees, by W4MND. A simple method of fabricating aerials from commonly available materials.

A Portable Dipole, W1CEJ. All-band 40-10 metres.

Product Detector and A.G.C. for the Knight Kit R-100A Receiver, W2AEF.

"CQ" Reviews the Allied Model A-2515 Receiver, W2AEF.

"RADIO COMMUNICATION"

July 1969

A V.F.O. Controlled Two Metre Transmitter, G3NOH. The v.f.o. operates over the frequency range 18.18-16.18 Mc. and after amplification is mixed with a frequency of 162.18 Mc. produced by a crystal oscillator on 27.03 Mc. which is multiplied by six before mixing to produce an output in the two metre band. The final amplifier uses a QQV03/20A operating with 400v. on the plates.

Simple Filters for Transmitters on 144 and 432 Mc., G6JP. A three-element strip line filter is described which is 20 db. down 10 Mc. off resonance.

Conversion of Circuit Diagrams to Veroboard, Tag-Board and Printed Circuit Layout, G3PEQ. Some useful clues to achieve a clean layout on that piece of home-built gear.

Technical Topics, G3VA. Pat Hawker reviews articles from a number of sources. Those of greatest interest are: SIC Transceiver, Line Output Valves as Linear Amplifiers, R.F. Power Transistors.

Which Filter? G3XIW. his article discusses filter designs for various purposes.

August 1969

A C.W. Keyer using Digital ICs, G3LBX. A very sophisticated keyer for use with a double paddle. In the hands of an expert it is stated to produce faultless Morse in an effortless manner. Not guaranteed to correct operator mistakes.

Long Term Observations of Meteor Scatter on 70 Mc., G3MNQ. Describes equipment as well as results. Could be of interest to anyone on v.h.f.

Technical Topics, G3VA. Pat Hawker reviews publications and comments on technical articles from magazines which are published for the professionals. He turns up some very useful information, his articles are always interesting. This month the "new one" is "Miniature Active Receiving Aerials". In case you do not know these are aerials with an active element right in the aerial. The active element to date has been a transistor, some amazing results are being claimed. A v.h.f. version for Airtraffic Control work has been designed to survive a lightning strike without a transistor failure.

I.A.R.U. Region I. Brussels Conference, by G2BVN. The agenda is given for a conference which could be of great significance world wide.

Bringing the Lafayette HA350 on to Top Band and Medium Wave, G3IAG. Since some of these receivers have been sold in Australia this article could be of interest to many.

A Case of No T.V.I. Now, G3TR. John Graham discusses various methods of reducing the incidence of t.v.i. There has, of recent months, been a resurgence of interest in this subject. This would appear to indicate that t.v.i. is becoming more common and that steps to kill it are once again necessary. The countries which are producing the information on how to combat t.v.i. are the U.S.A. and England. From my reading of some of them, it appears that colour t.v. is much more susceptable to t.v.i. than monochrome. In the U.S.A. they use 300 ohm ribbon feeder cable similar to that used in Australia, and t.v.i. appears to be more prevalent where an unbalanced situation exists. In England, most antenna systems are cabled in co-ax and there much of the trouble would appear to be due to the fact that the earthed braid of the co-ax. is part of the signal circuit and the interfering voltages are therefore injected into the receiver in series with the wanted signals. Perhaps one good answer to this problem would be to use "twin shielded" cable of the appropriate impedance, the braid could then be kept apart from the signal circuits. If anyone has any figures of the relative immunity to interference of any sort whatsoever I would like him to contact me.

Bridge Balun for the 80 and 40 Metre Bands, G3TR. A device which should be of much use to the average Amateur and is easy to construct.

"SHORTWAVE MAGAZINE"

August 1969

This magazine publishes a minimum number of articles each month but they appear to be of a consistently high technical standard. August is no exception, and offer the following:

Aerial Tuning Unit for All-Band Operation, G3KFE. Incorporating a v.s.w.r. indicator, this tuner covers all Amateur bands from top band to 10 metres and matches the low impedance output of a transmitter to a single wire end fed aerial.

Coil Changing on a G.D.O. GW3PJT suggests that by using an old octal type tube base and connecting to suitable pins that arrangements can be made to tap the coil at appropriate places and ensure that four ranges can be covered with one tapped coil. Taps are changed by rotating the coil in the socket.

Application of the Inverse Balun, G8COB. This appears to be the "gem" of the August issue. It deals with a new type of balun used by J-Beam Engineering Ltd. in their aerials from h.f. through to u.h.f. Insufficient data is given to permit construction without experiment. It appears to be a very useful gadget for use at the centre of a dipole, in a quad driven element or elsewhere when it is desired to convert an impedance from balanced to unbalanced without changing its value.

Transistor Gain Measuring Meter, A. Langton. A simple meter to permit you to keep tabs on your transistors.

Vanguard, Valiant, LG-50, DX-40U. G3OGR takes the beginning Amateur for a run over some of the transmitters built in Britain and popular in Amateur circles immediately pre-s.s.b. He suggests they are good buying as second hand units for the beginning Amateur to cut his teeth on.

Design for an Amateur Band Receiver, by G3TDT. Part 3, the last of three articles covering the construction of a solid state Amateur Receiver.

Mobile on a Bicycle. G3WPR, who is seventeen years of age, describes how he fitted 2 metre gear to his two wheeler.

Group Morse Training, GW8PG. The author takes students through the complete training syllabus stage by stage. It would be well for any Amateur who wishes to become proficient in what is today, a dying art, to study this article in detail.

"COMPREHENSIVE QUADS"

As its name implies, this publication deals with Quad aerials. It is published by "The Cornish Radio Amateur Club" and was compiled by "A Square Fella," John G3OFN, who is reported to have spent some three years of spare time comparing Quad performance. He deals with and compares all of the well known designs including those by Bill Orr, W6SAI, Labgear and others, and then goes on to add a design of his own. This small booklet of sixteen pages would be a useful adjunct to anyone's library. The review copy was supplied by Bert Semmens, VK3GS.

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

It is pleasing to note that conditions on all bands have been good, the DX on 15 and 20 metres has been in many cases better than usual, while some of the openings on 10 have been described as the best ever. The lower frequencies still have a goodly share of DX, and top band in particular has shown increased activity this month. Indications are that there will be a minor peak in sunspot activity before the long decline continues, this is reflected in the forecast figures for October and November, which are the same as May and June—that is 89 and 88.

Without being accused of favouritism, I would like to dwell on 160 metre doings. George Allen over in Perth has always concentrated on this band, and up to time of writing had logged K1PBW, W1BB/1, K2ANR, W2EQS, W3DPJ, K8DHT, W8ANO, W8GDQ, W8BKA, W9BKA/8 and W9UCW. George mentions that Peter Drew has logged the same stations plus W5RTQ. VK6NK and VK6CW have been active as well.

A suggestion from K2GNC in a letter to George is of interest and I quote: "The QRM at the 1800-1810 end of the band at the appearance of just one VK is terrific, and I would like to let the VK gang know that we will QSX 1825-1830, thus they will be heard and we will have many more QSOs."

Recent openings on 160 were recorded when K1PBW took over from K3DPJ on 20th Sept. and started the ball rolling by working VK-3KS, on which night Ivor and Mavis worked seven W and VE stations. Barry VK5BS sends a list similar to George Allen, but with VE-3DU and W9UCP included. He also reports hearing JAs. With the high noise level here, I could only hear VKs 3QI and 3AUJ.

W5NW, the Vice-President of the A.R.R.L., is due in this country early in the new year and will be in VK5 in February.

Further activity from the Chatham Is. will take place from October until April 1970 by Lester, using the call ZL3PO/C. He will be using a mini beam for 20 metres and trap dipoles for other bands. A Trio TS510 transceiver will be used, with a separate v.f.o., and the frequencies are: c.w. 3520, 7020, 14020, 14045, 28050; s.s.b. 3790, 7065, 14150, 14185 and 28600. All frequencies plus or minus 5 Kc., answer as directed, and QSL to George ZL-2AFZ, who will also be handling the QSL chores for the ZL operation next year from VK0.

VR1Q has changed his QSL manager, WA-3ATP Ben Schafer, 7649 Malvern Drive, Philadelphia, P.A., 19141, took over on 1st Sept.

New prefixes still appear, but I guess that with the rat race now extended to new prefixes by Amateurs and Short Wave Listeners alike, this will continue. ZM will be used by the ZL gang as an optional prefix for the Cook Bi-Centenary year, Poland is now using 3Z1 through to 3Z9 from July 22, 1969, to July 22, 1970, to celebrate the 25th anniversary of the Liberation of the Polish people. The PA chaps are using PD3 at the moment, and PD3KOR was logged here a few nights ago. 4J and 4L were mentioned last month and further to this, we can report that they were operating from Zone 19. PD3 prefix mentioned above was for the Idzerda Memorial Contest over the last week in Sept.

The Pacific net still continues as a major source of DX; note however that the Friday night operation now starts at 0600z, with KH6GLU, Box 762, Kaunakakai, Hawaii, 96748, as net control. ZS1ANT in African Antarctica was a participant this week.

KA1C operation from Ogasawara Is., formerly Iwo Jima, went according to plan from Sept. 21-26 and his QSLs will go via WA8NZH. Please enclose s.a.s.e. or s.a.e./IRC, but donations will not be accepted.

GC2LU was packing the proverbial wallop into VK2 last week on 20. He is H. Chater, Flat 1, 14 Clarendon St., St. Helier, Jersey.

A couple of months ago I mentioned the prolonged illness of Frank Diehl, of Buffalo, New York. Frank passed away in the intervening period and will be missed by his many friends throughout the world.

Ed W3KVQ/2, 2308 Branch Pike, Cinnaminson, N.J., 08077, U.S.A., reports that he is the one and only manager for Fr. Moran 9N1MM. It would appear that much mail for Ed actually finishes up at either WN3KDQ and K3KVQ.

As you have probably noticed, Bill VK0MI is now on 20 s.s.b., and c.w./a.m. all bands to 10 metres. QSLs go to Greg VK7KJ. Greg, by the way, is having a great run of DX, and supplied quite a list of stations worked, ranging from VK0 to OX. As a matter of interest, "A.R." policy these days is to publish where possible current DX news and not long lists of countries worked. **But, please send them in** as this information is sought after by many of the publications who supply us with information and is also circulated by tape amongst the ever increasing circle of contacts we have here.

It is pleasing to note that Stew W1BB is back on the air again. He has been logged across the Atlantic by one of our G-land contacts, Frank Dyball, of Coventry.

Re cards for ex VK4HG, Willis Is. Eric Trebilcock reports that the VK3 Bureau is unable to deliver them, but they can still handle QSLs for ex VK4EV of Willis Is. Despite his heavy commitments with the Bureau, Eric Trebilcock, with a record of 302 countries heard, 299 confirmed, is still our number one S.w.l.

For those a.m. addicts, VE0NEC/MM was on 20 metres a few weeks ago using this mode. Steve Ruediger over in VK5 reported him at very low strength, about four by three, but with little QRM.

Operation from EA9ER continues, the night before he works DX, he takes a list of would be callers from an Italian station and works these the next evening. At the first sign of a breaker, he goes QRT.

Recent operation by WA4MMO/KC6 now completed, and QSLs are being handled by DX-pedition of the month, W2GHK, Box 7388, Newark, N.J., 07107. Processing of logs commenced Sept. 20.

Following an outcry by the proverbial DX gang, the proposed cancellation of the "CQ" DXCC for s.s.b. **will not now take place.** Rules are the same as for DXCC phone, except that all contacts must be two-way s.s.b. There are separate certificates for 100, 200 and 300 countries. Further data from W8HDB.

Further to recent operation by TI8NAM/TI9, TI4JP is sending the necessary papers to the A.R.R.L. DXCC Awards Committee substantiating this operation. The landing was made from a U.S. registered vessel and is documented in the ship's log. TI2CAP will be doing the QSL chores on behalf of the Radio Club of Costa Rica.

Recent Falkland Is. operation on 3.5/7 Mc. operation was made, with the express purpose of assisting 5-band DXCC hunters. If you missed this, you can usually arrange a sked by contacting Eric Chulvers, 1 Grove Rd., Lydney, Glocs., England.

Operation from Guernsey will continue into October by GC5AET on all bands. QSL for the operation to DJ1QP, G. Schnautz, DX Editor, Falkstr. 1, 58 Siegen, Germany. IRC's but no s.a.s.e.

It has been confirmed that 7G1CG was not operating from Guinea and manager WA3HUP will return all QSLs received.

GD3PBD, Peter Dodd, is now on the air from the Isle of Man. No trouble with QSLs for this one as they are handled by DX-pedition of the Month. QTH shown in preceding text.

WF6NNW is not a rare piece of DX but a special prefix for the American National Newspaper Week prefix hunters. Operating on the low end of 10, 15 and 20 for the early part of October. he will be on s.s.b., and requests QSLs to WA6AHF, Robin Hughes, 17,494, via Alamitos, San Lorenzo, Calif., 94580, with SAE/IRC.

The proposed operation from Serrana Bank by K6JGS and party was cancelled due to transport difficulties. Now expected to go next April.

YU2NFJ is on Dalmation Is., Zone 16, usually using 14250; op. is Zlatko and QRV island of HVAR.

Ulli Dehning, 35 Bellevue Street, Kloof Nek, Cape Town, Rep. of Sth. Africa, is the QTH of ex 7P8AR, now licensed as ZS1UD. QSLs for ZS8L, ZS9D and 7P8AR may be sent to this QTH, and Ulli wishes to thank all who offered their services as QSL manager when W4BRE was forced to quit.

U.S.A. personnel will receive operating permits for HS as from October 1, and HS3AL (W9SZR) will be first on, QRV 14045 and 21045 c.w.

KJ6CF is usually active in the Pacific net and will QSL via P.M.R., Box 141, A.P.O., San Francisco, Calif., 96305. Also in the vicinity is KC6JC on Senyavin Is., East Carolines, QSL W2RDD.

For island hunters, KL7GPB is on Adreanof Is., W6IBU/KL7 on Rat Is., with KL7EIJ on Kodiak Is.

The new operator for KM6BI is now QRV in more ways than one. He found over 1,000 unanswered QSLs there, on his arrival, and is going to reply to the lot. He is R. McCormick, Amateur Radio Station KM6BI, F.P.O. San Francisco, Calif., 96614.

Trucial Oman activity still plentiful, with MP4TDB QSL via ON5MG; MP4TCQ, J. Hammond, Radio Troop, 222 Signal Sqdn., B.F.P.O. 64; and MP4TDA, Ray, QSL via G3HSE, D. French, 78 Brocklehurst St., London, S.E.14, doing the honors.

SK6CF was a special prefix used for some unknown reason recently. QSLs for this operation go to Bengt-Arne Johansson, Gullregnsvagen, 434 CO Kungsbacka, Sweden. He requests a SAE/IRC.

TA2EA is apparently legitimate, as he is Vice-Pres. of T.R.A.C., is stated to be QRV on 3.5, 14 and 21 c.w. at present, and soon will be on all bands c.w./s.s.b. SM7DQC is stated to be his QSL manager. This info from Geoff Watts, DX news-sheet.

TF is a reasonably rare country for us down here. There are several active stations, listed here with their QSL managers. TF2WLM (K4SAK), TF2WLQ (WA2WIB), TF2WLR (K7NTW), and TF2WLS (WA5RTB); finally TF2WLW via WA0GCI.

Operation from Kure Island is planned for Nov. 10-14 by KH6s NR and SP on 14230, 21295 s.s.b., QSX 14240, 21295, also some c.w. operation. Calls most likely KH6KI or KH6NR/KH6.

6O1KM operating 14185 and 14215 from 1400z daily is now active. He will be at the QTH for one year, and requests QSLs as follows: four IRCs for airmail QSL, five IRCs for airmail registered, all others by sea mail at end of quarter. Kelly Wayne McCamy, Box 948, Mogagiscio, Somali Republic.

TA1NC is active and reported genuine on 14276 and 210, with the QSLs going to either DJ0UC or Box 95, Karakoy, Istanbul.

UA1KED is still heard from Franz-Josef Land, Zone 40, but a further expedition by UA1CK and other operators from UA1KBW are scheduled from there next April as UA1-KBW/1.

VQ8CFB is active and expects to be at the St. Brandon Met. Station for about six months. He has been spotted on 3650 at 1500z and uses 14320 u.s.b./l.s.b. QSL to VQ8 Bureau, Box 467, Pt. Louis, Mauritius. He is Zone 39.

New Zealand stations are due to start using the ZM prefix for the Cook Bi-Centenary year as from 1st October, until 31st December, 1970, with the Kermadec Is. operation by ZL2ANX using ZM1AAT/K, and the Chatham Is. ZL-3PO jaunt using ZM3PO/C. Proposed Campbell Is. operation cancelled.

AWARDS

Trans Canadian Award: Five contacts in each of the VE call areas, a total of 40 cards, plus 5 in VO1 or 2, plus one VE0MM. Of the five VE8s worked and confirmed, one must be in the Yukon, and one in the N/W territory offshore islands.

Sea Way Award: Ten contacts along the St. Lawrence sea-way. One in Pt. Arthur or Pt. William, one in Greater Toronto, one Montreal, one in Greater Quebec City, other six in other municipalities en route.

Provincial Capital Award: Ten cards, one in each of ten provincial capitals.

To claim the awards, you need the QSLs as listed, plus 10 IRCs or one U.S. dollar for each award to VE3ACD, Mort Wolfson, 305 Rosemary Rd., Toronto 10, Canada.

Nth. Illinois DX Assn. Award: DX stations need to work seven Nth. Illinois stations since 1st Jan. 1968. Log info, plus 75c or five IRCs, to Bud Frohardt, 3620, N. Oleander Ave., Chicago, Illinois, 60634, U.S.A. Some of the stations you can work are K9CSW, KDI, KYF, LUI, VLE, WEH; W9ARV, BPW, BZW, DWQ, DY, EXE, FKC, GXH, ILW, JUV, LKJ, NZM, OD, OHH, OPD, QQN, WYB, and WA9IVL.

W4BPD Award: Class one for working Gus from five locations, class 2 for 10 locations, class 3 for 15 locations. QSL info., plus one dollar U.S.

OE Award: Issued for working 100 OE stations since April 1954. QSLs plus 10 IRCs to Award Manager, Box 999, A-1014 Vienna, Austria.

Unfortunately I had to omit any QTH and managers' lists, due to the fact that they have not arrived from the U.K. The response from readers has been very pleasing this month and I acknowledge tapes or letters from Barry VK5BS, Ivor VK3XB, Greg VK7KJ, George Allen, Maurie Batt, ZL2AFZ, Steve Ruediger, Mac Hilliard, and Maurie Cox via phone, Bernard Hughes ISWL, Geoff Watts DX Newssheet, Long Is. DX Assn., Eric Trebilcock, and my own observations on the bands.

As well as the following, I have had a number of letters, phone calls and even callers not enumerated above, commenting on the lack of provision for the S.w.l.'s in the Bi-Centenary year. I will make no comment on the matter in this page, as my comments could be interpreted as being official. I suggest that all queries in the matter should go to your Federal Councillor. 73, Don L2022.

TECHNOLOGY CAMP AT BLUE LAGOON C.Y.C.

"Receiver on . . . lights on . . . prepare to launch" — final commands came clearly over the walkie-talkie — "Let her go NOW!"

The giant eight-foot box kite soared into the night sky, sixty, eighty, a hundred feet up. Yards of nylon cord were paid out as the U.F.O.-like machine, with radio controlled flashing lights, climbed like an eagle into the darkness. This was another absorbing project that thrilled both campers and leaders alike at Tasmania's first Technology Camp at Blue Lagoon Christian Youth Camp near Dodges Ferry.

Transistor radios, monophonic organs, model motors and a radio controlled camera to take aerial photographs from a kite were just some of the other constructional projects completed by senior high school boys.

An Amateur station set up on the site with call sign of VK7TC/Portable provided an introduction to radio communication and a thrill to many with QSOs to Japan and U.S.A.

Why all this bother for five days? To open new doors to good challenging hobbies and careers, to deepen insights, to raise relevant questions and get some solutions.

An engineer, a research scientist, a technician, teachers and others gave generously of their time and talents with the result that some boys completed practical work for Y.R.S. certificates. As the camp came to an end, many were asking about the possibility of another one next August holidays.

—Brian L. Jones, B.Sc., Dip.Ed.

— . . . —

CHANGE OF PREFIX FOR NEW ZEALAND

To draw greater attention to the Cook Bi-Centenary Celebrations (celebrating Captain James Cook's first landfall in the Pacific Ocean at Gisborne, New Zealand, on 9th October, 1769), the New Zealand Post Office has authorised the optional use of ZM1, ZM2, ZM3, ZM4, and ZM5 in place of ZL1, ZL2, ZL3, ZL4 and ZL5 from 1st October, 1969, to 31st December, 1970.

— . . . —

ZM COOK BI-CENTENARY AWARD

1. Applicants must contact 50 different stations during the period 1st October, 1969, to 31st December, 1970, using the prefix ZM— with at least one station from districts ZM1 to ZM4.
2. Applicants must forward a check list of stations contacted with **full log data**, which has been certified correct by two other Amateurs (no QSL cards are required).
3. Post to N.Z.A.R.T. Awards Manager, ZL-2GX, 152 Lytton Road, Gisborne, New Zealand, with three I.R.C. to cover mailing costs. Extra must be sent if airmail is required.
4. Endorsements will be made for c.w., phone and band of operation.

VHF

Sub-Editor: CYRIL MAUDE, VK3ZCK
2 Clarendon St., Avondale Heights, Vic., 3034

Well this is the last lot of V.h.f. News that I will be editing as Eric Jamieson, VK5LP, is taking over the position. I would like to thank all those contributors who have sent in news in the past and hope that they will continue to send it to Eric Jamieson, VK5LP, Forreston, South Australia, 5233.

I hope that I will be speaking to many of you v.h.f. enthusiasts during the coming summer. 73, Cyril VK3ZCK.

VICTORIA

Quite a number of DX contacts have been made in VK3 over the past few months, including all adjoining States, but alas only a favoured few appear to have been around at the right time to work these stations. Going back a year or so, it may have taken lower powered stations up to an hour or more to work the DX stations, and even those with after-burners had to wait their turn; not so recently, DX stations have been heard waiting for VK3 city stations to answer them. Judging by the prediction charts, 6 metre DX could be possible to JA and W areas between 1100 and 1600 daily, so six metre enthusiasts now is your chance. (See news below from N.T.)

Last month the VK3 V.h.f. Group held their 6th Annual Convention at the Moondarra Dam near Moe in Gippsland. Many well known Amateurs and their families attended and all reported that they had a very enjoyable week-end. Everyone wishes to thank the Eastern Zone boys for their part in arranging the accommodation and other details that make these functions a success. 73, Peter VK3ZYO.

Midland Zone: Activity in the Zone is on the increase, both on v.h.f. and on the lower frequencies. There are now 17 carphone units in regular use, also many of the Zone members are active on two metre a.m. The Zone plans to test a channel 4 repeater in the very near future and because of this is changing to Channel B for every-day use, so as not to cause interference. 73, Bill VK3AJX.

North-Western Zone: The boys in the Mildura area are planning to start a net on six metres for the coming summer, the frequency they intend to use is 53.032 Mc. Max VK3AKT and others are very busy at the present converting some Pye Mark III. Reporters to this frequency. Also, the Mildura Technical School has formed a radio club and has applied to the P.M.G. for a club call sign. The club will be on the air once a month and will be under the control of the Zone members. 73, Noel VK3AGF.

NORTHERN TERRITORY

Six Metres: The band has been patchy but very good generally speaking. Prior to May, I was only using the low powered a.m. mobile and nightly worked JAs using the TH6DX antenna. Now I have the 9-element back in service and the 200 p.e.p. o/p. s.s.b., things are back to normal. The last contact for the season just concluded was with WA6SXM in Dublin, a Los Angeles suburb, on 27th May, 1969. The band then went dead until late August when the JAs started to appear. At this time I commenced skeds with HL9WI on 14156 and 52.010 concurrently. We were rewarded with a three-hour two-way (s.s.b. and c.w.) QSO on 4/9/69; this now makes 11 countries to my six metre list.

Overseas v.h.f. DX news: AP2MR (West Pakistan) is on the air after having trouble paying import dues. He's a very keen Amateur. Al KR6TAB reports not much good up there, somehow think that he is not listening. Hong Kong reported on 50 Mc., but not worked.

VK9DJ hopes to be s.s.b. soon with very high power. Lance VK4ZAZ has been heard working JAs and HL9WI, but cannot hear Lance. Darwin Radio Club uses 146.0 Mc. f.m. and the 10 stations have great fun. Will be in VK2/VK3 in November and December. 73, Doug VK8KK.

SILENT KEY

It is with deep regret that we record the passing of—

VK2BSP—Stephen Pedemont.
Harry Major, VK3 Associate.

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FOR SALE: Bendix Frequency Meter BC221J $35; Pye PTCA2750 low band 500 watt a.m. base station, with transistor modulator, receiver muting, 6/40 final, complete with microphone in good order, $60; R.S.G.B. Handbook, 3rd edition, $3; all sorts of valves, capacitors, etc., available, write stating your requirements. Wanted: Circuit or Handbook for TCA1645/B transceiver for copying. Will pay postage both ways. VK3UG, 24 O'Dowds Road, Warragul, Vic., 3820.

FOR SALE: Collins 75A3 receiver, $250. Halicrafter HT37 transmitter, $200. Heathkit HW22 transceiver covers 80, 40, 20 mx, plus heavy duty a.c. and mobile power supplies, $210. Heathkit O-Multiplier, $8. All items excellent condition. Heathkit HP10 d.c./d.c. power supply, unused, plus spare transistors, $45. 240v./115v. 500w. transformer, variable output voltage, $10. Ray Baty, VK2ANB, 41 Lawson Pde., St. Ives, N.S.W., 2075. Phone 44-3707.

FOR SALE: Eddystone 888A Rsvr., mechanical and electrical condition good, 160 mx to 10 mx Amateur bands, $175. Also complete AR7, nearest offer to $55. VK3ADO, 1 Tennyson Ave., Kilsyth, Vic., or phone 723-2645 after 6 p.m.

FOR SALE: FL100B Tx, complete with new spare 6DQ5 final, p.t.t. mic., manual, covers 80-10 mx, u.s.b.-l.s.b., vox, pwr. supply in-built, can be heard on air, $190. T. J. Lally, Box 257, Clare, Sth. Aus., 5453. Phone Farrell Flat 7.

FOR SALE: Large quantity of Ham gear in good order including 9 Mc. s.s.b. exciter, pi coupler unit, tx and rx tuning condensers, power xformers and chokes, etc. S.a.e. for list to VK3PR, W. R. Jardine, P.O. Box 95, Leongatha, Vic., 3953.

FOR SALE: MR3A Carphone Junior, 2 mx f.m. transceiver, complete, $40.00. Heathkit Mohican GC-1A solid state all-band rx, 450 Kc. to 32.00 Mc., $120.00. H.B. 80-10 mx s.s.b.-a.m. tx, 220w. p.e.p., 8236 p.a., 9 Mc. McCoy filter, cost $350, sell $150. VK3ZX, Phone Traralgon 73-135.

FOR SALE: Swan 350 u. and l.s.b., latest xtal filter, matching pwr. supply, xtal cal., full 10 mx band, will trade 3-band transceiver. N. Sneddon, P.O. Wamberal, N.S.W., 2251.

FOR SALE: Yaesu Musen FL-DX-2000 Linear Amplifier, mint condx, $190 o.n.o. D. D. Kinnersley, VK4XI, 27 Oxley St., Edge Hill, Cairns, Qld. 4870. Phone 53-2068.

FOR SALE: Yaesu Musen FT-100 tcvr., 12 months old, s.w.r., quad, mast, 80/40 trap, okay, $450 offer. R. Ellison, VK6SE, Lot 51, Glenisla Road, Carmel, W.A., 6076. Phone 93-5265.

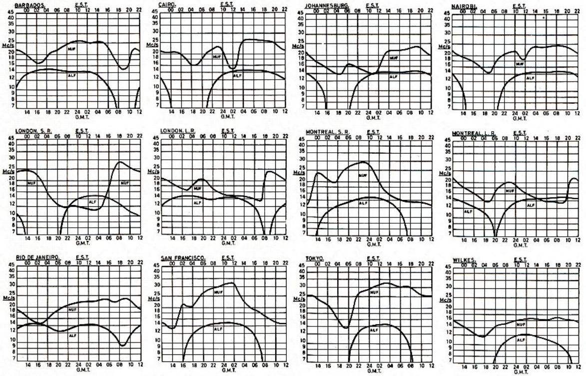
FREQUENCY METERS, BC221, in original sealed cartons with in-built 6v. d.c./230v. a.c. supply, earphones, charts, manual and spare valves. Few left at $70. Advise transport. G. B. Lance, 123 Webster St., Ballarat, Vic., 3350.

SELL: Collins PTO 70 c.p.s. 2.5-3.5 Mc., $25. Pabst 230v. blowers 100 c.f.m. similar to Rotron for blowing finals, three only, $7 each. BC348 with double conversion 85 Kc. Command i.f., no pwr. supply, not operating, $15. Bendix Freq. Meter and spare 1 Mc. xtal, $55. Transformer A & R type 1939 450 aside at 200 mills., 6.3v. 6 amp., new, $10. A & R type 1371, 1000, 850, 750 aside at 400 mills., new, $20. All items posted or freighted free. Williams, VK3IZ. Phone 437-1811 (Melb.).

WANTED: Cheap AR7 or similar. Condition unimportant. Phone Melb. 69-4989. 64 O'Grady St., Albert Park, Vic., 3206.

PREDICTION CHARTS FOR NOVEMBER 1969

(Prediction Charts by courtesy of Ionospheric Prediction Service)



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